

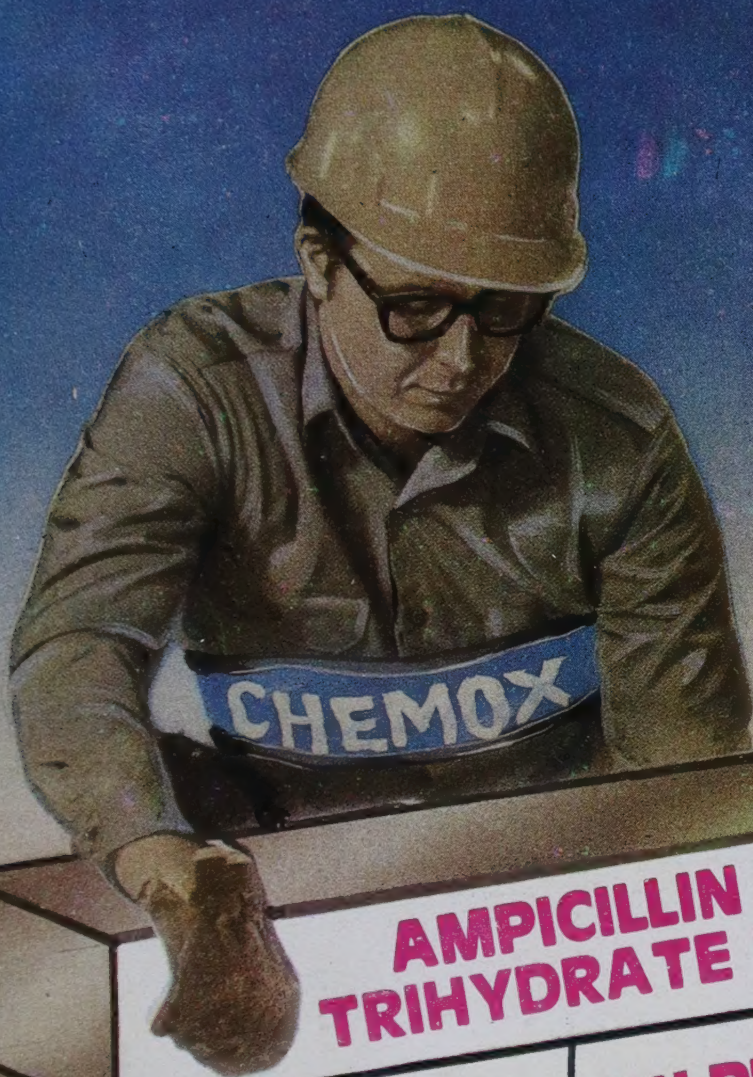
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CHEMICAL WEEKLY

VOL. XXXIII

FEBRUARY 16, 1988

NO. 23



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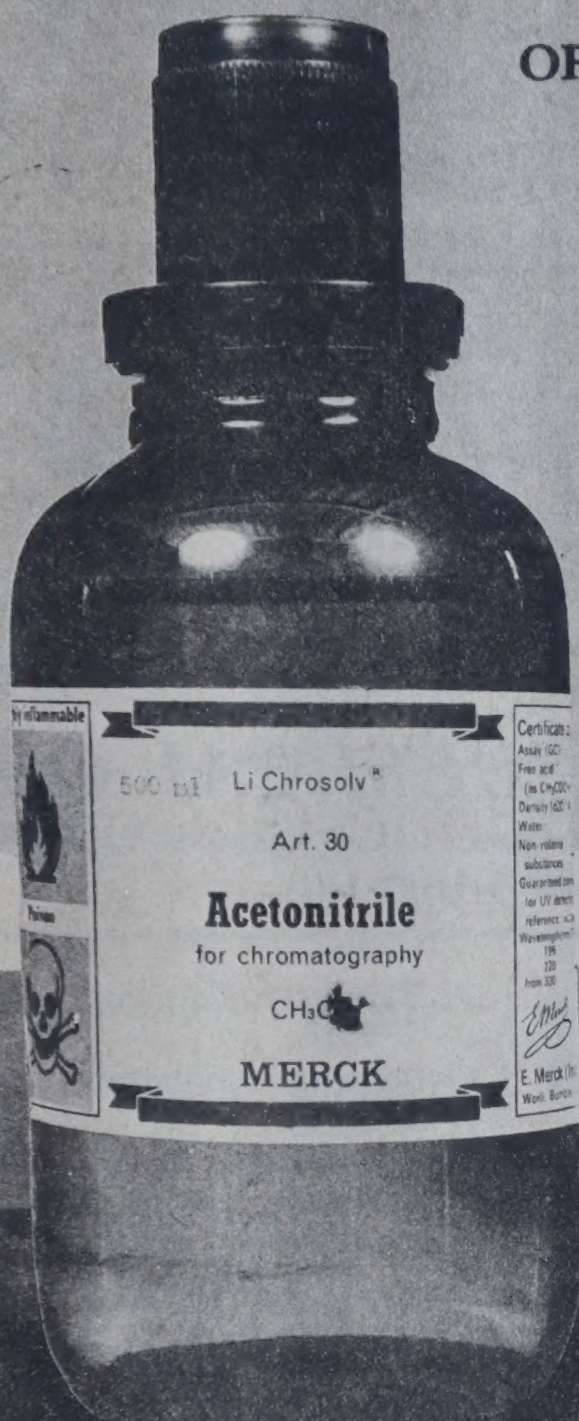
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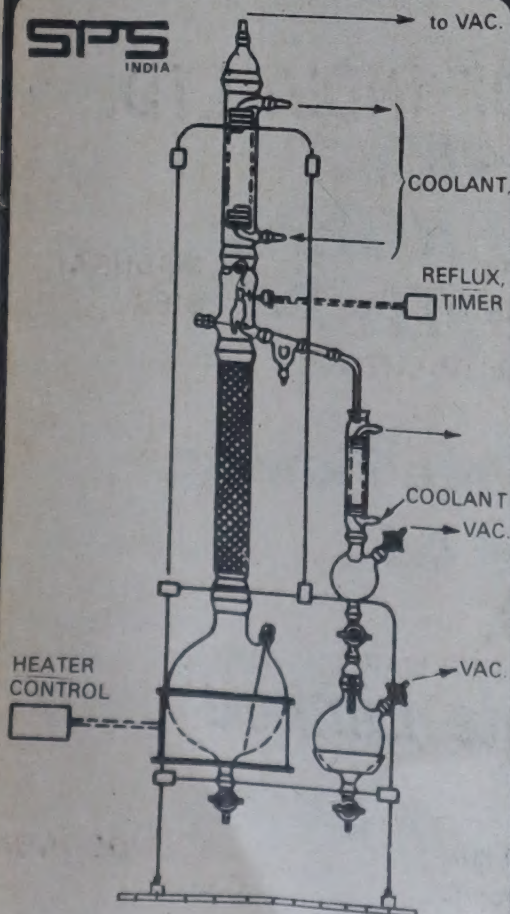
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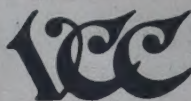
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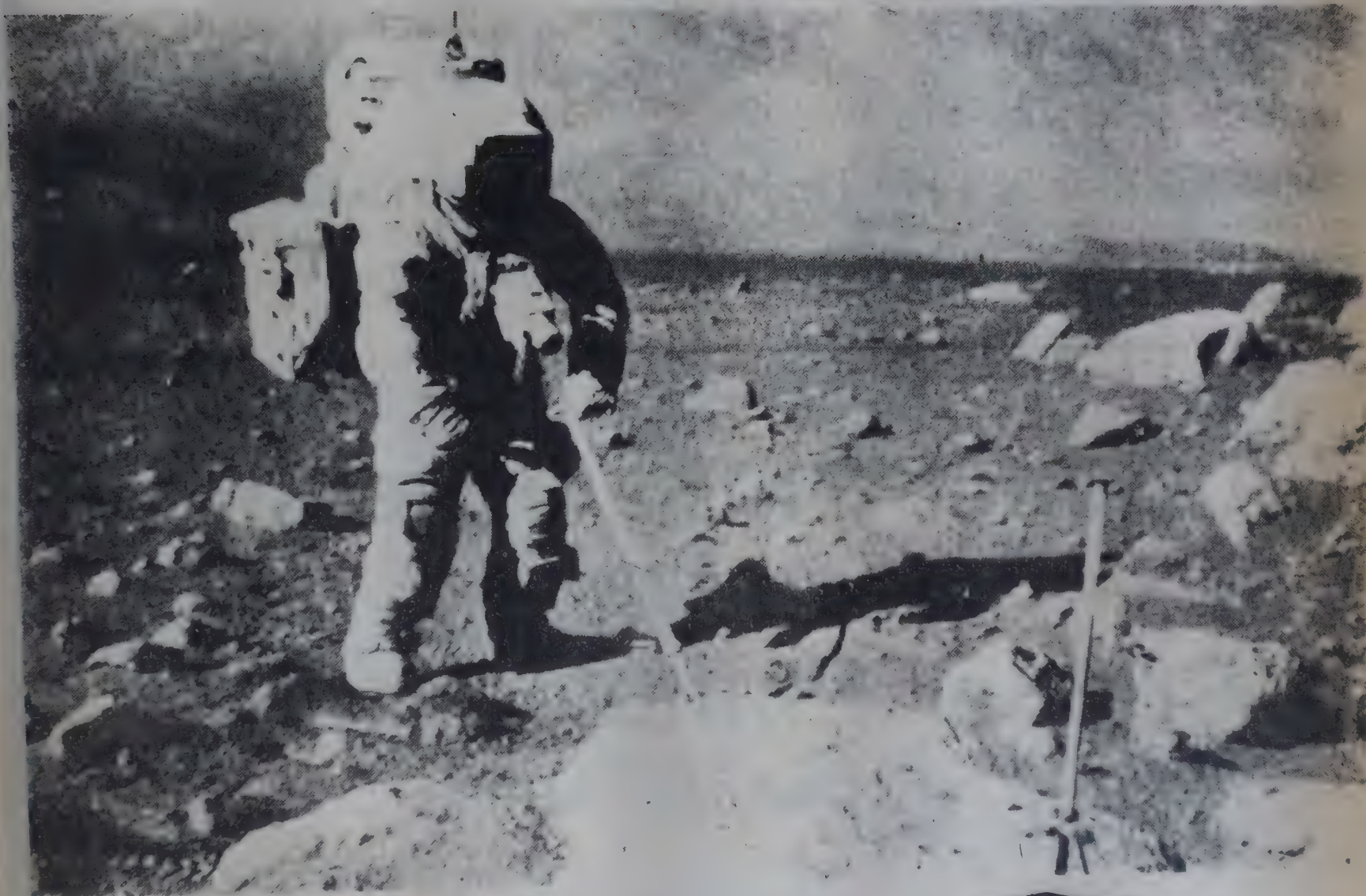
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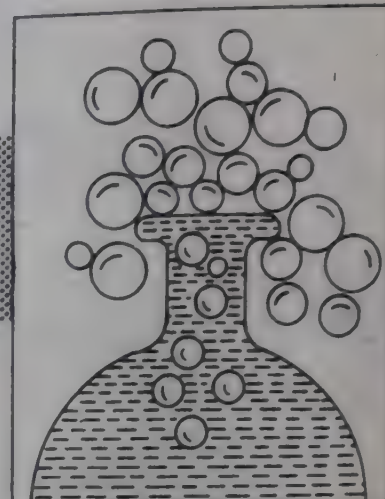
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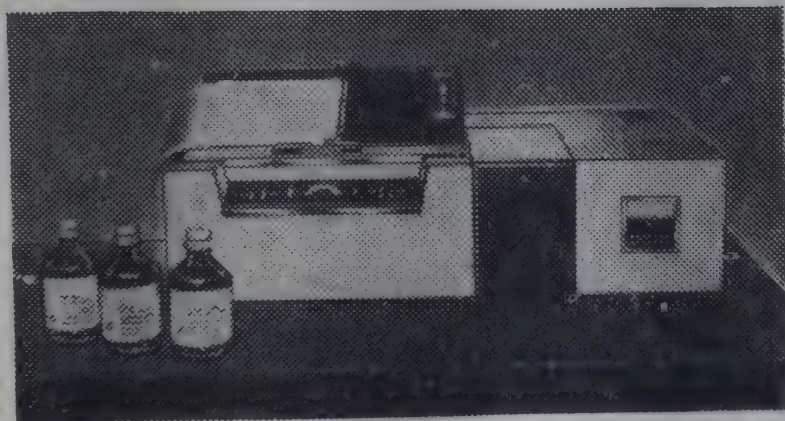
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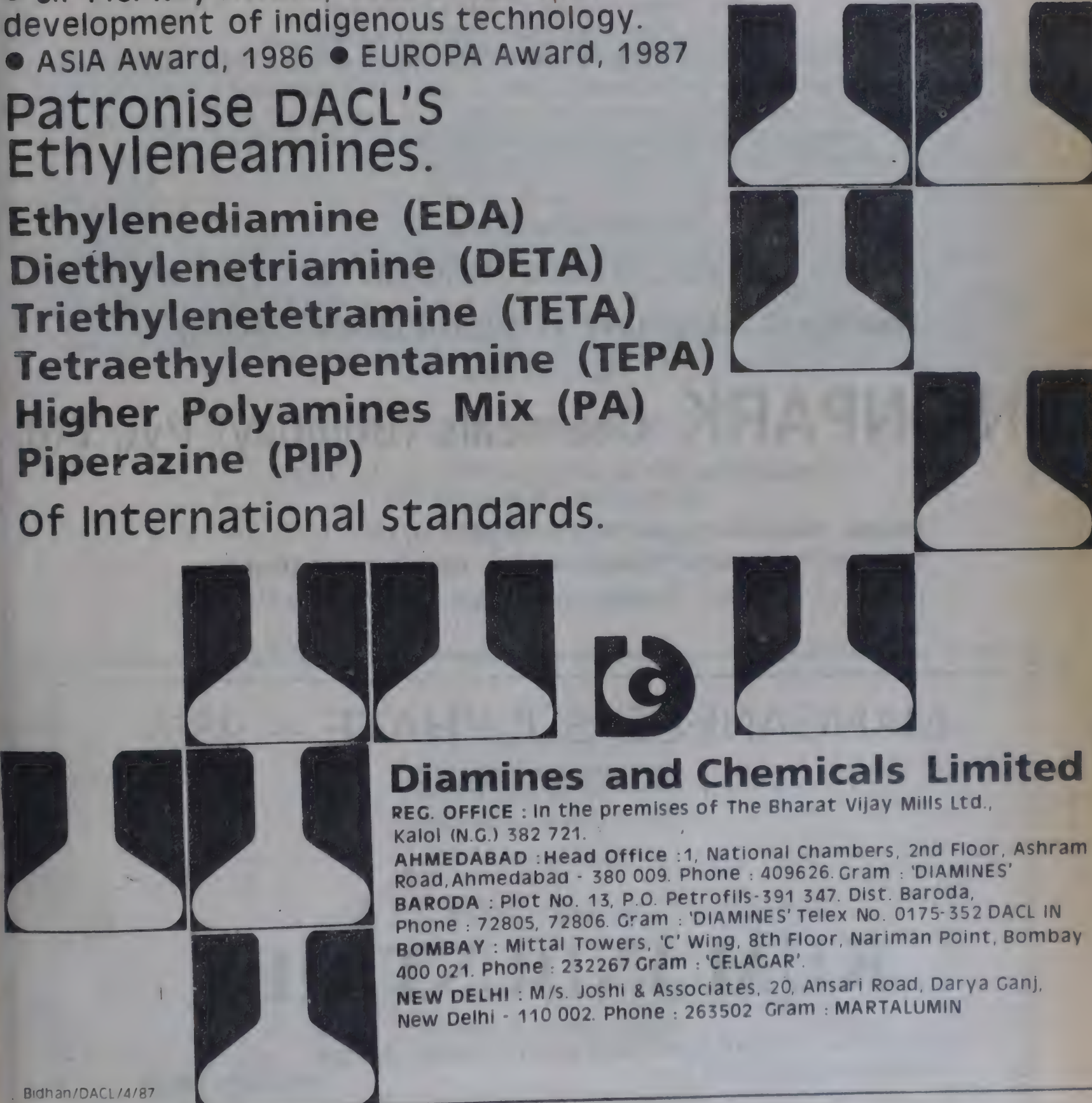
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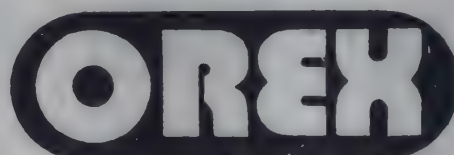
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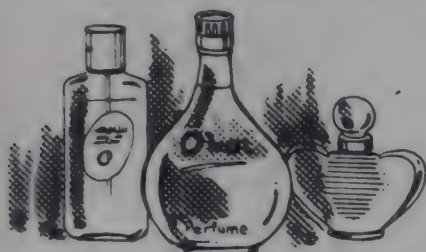
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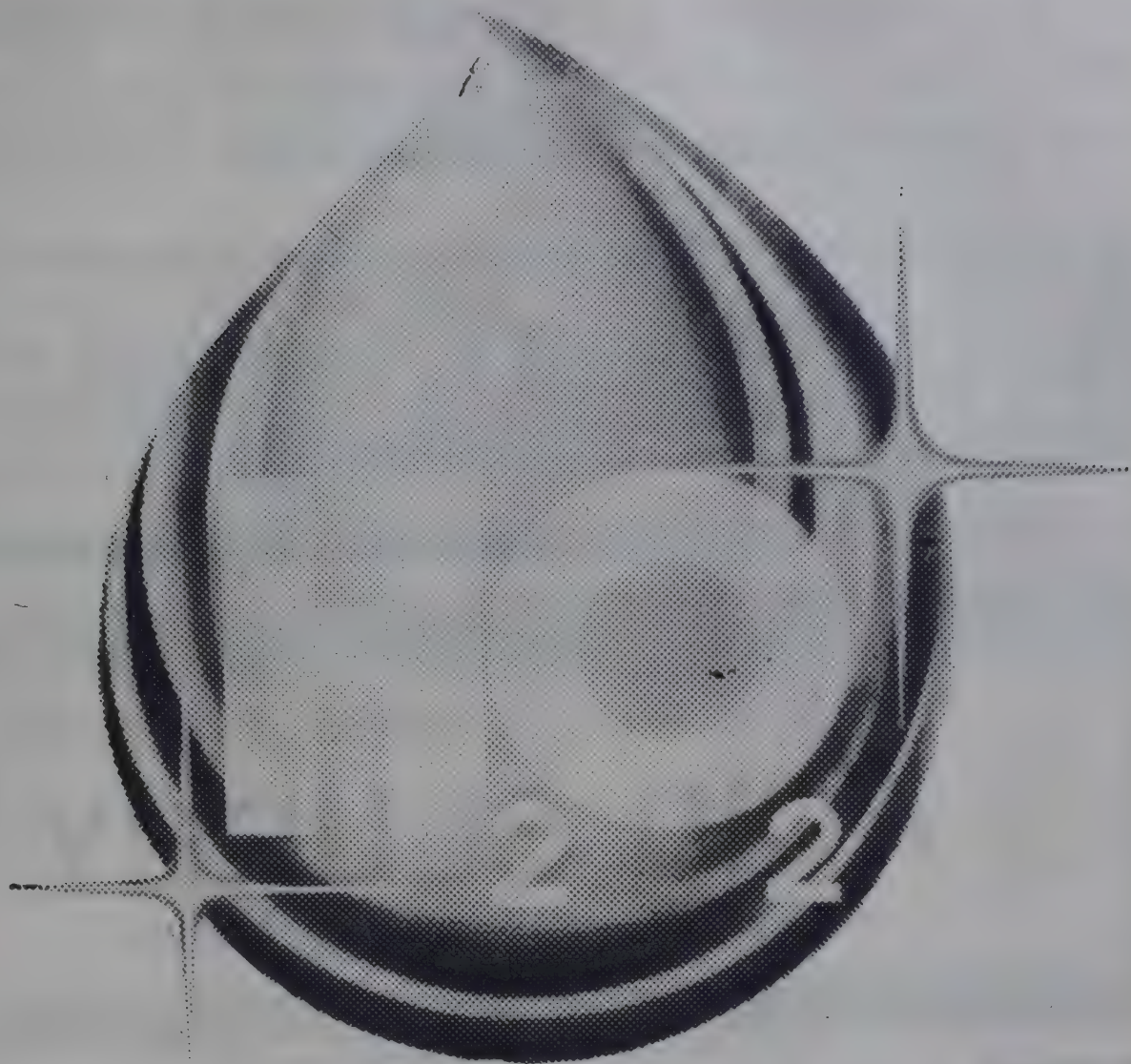
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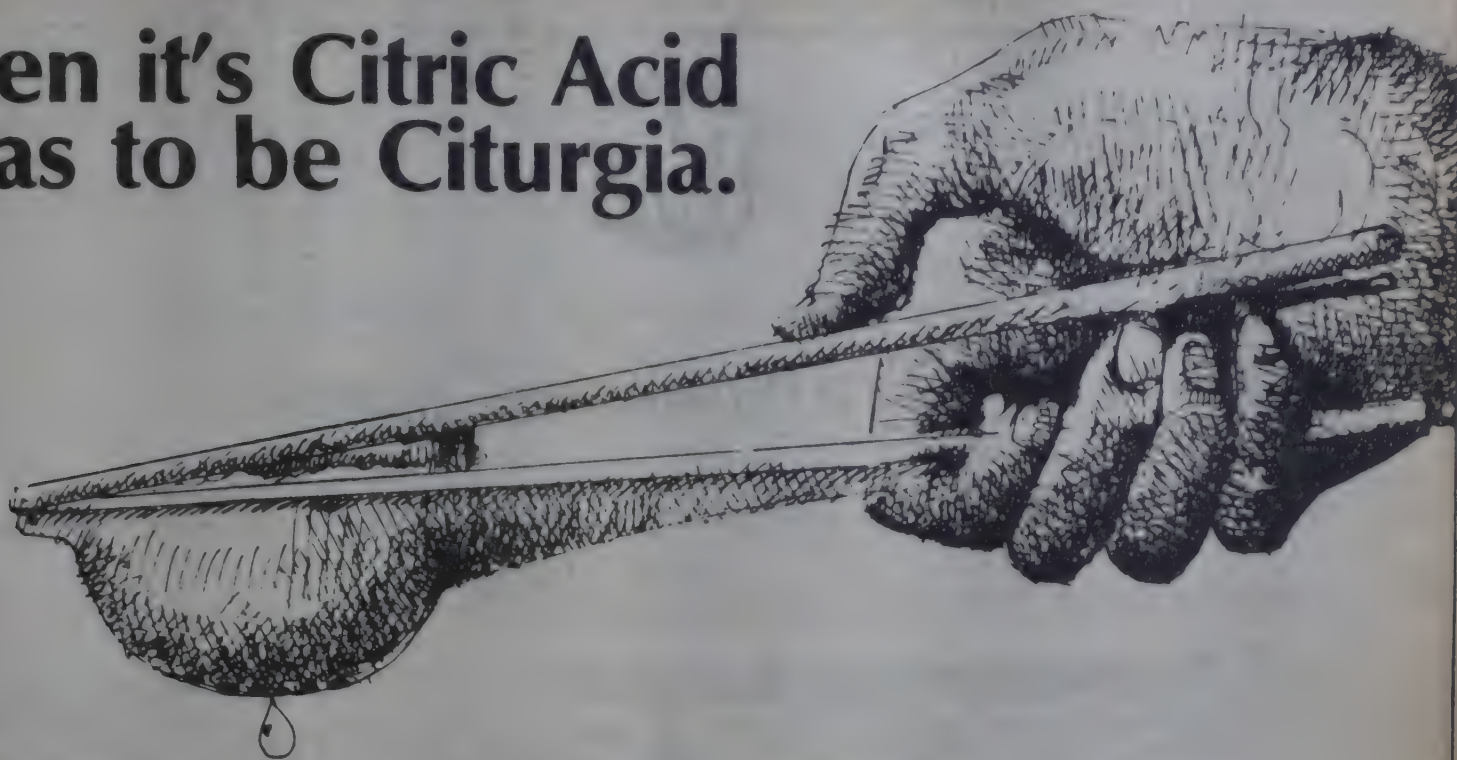
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CHEMICAL WEEKLY

VOL. XXXIII

FEBRUARY 16, 1988

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THE GLOBAL PETROLEUM SCENE

■ The world oil outlook is brighter now than it has been for some time.

The average price of a barrel has declined from its peak of over \$35 in early 1981 to just \$16 in 1988. Consumption has fallen a remarkable 9 per cent from its high point in 1979. The share of the world oil market controlled by the Organisation of Petroleum Exporting Countries (OPEC) has fallen from about half in 1979 to less than 30% now.

Some of the world's poorest nations, including most of those in Africa, are now virtually priced out of the oil market. Unable to pay for oil or make the investments needed to create non-oil-based economies, many Third World nations are in danger of becoming trapped in an economic underclass. In addition, several Governments that have chosen coal as their chief replacement for oil are now facing public health and environmental problems that may make a coal-based economy unsustainable.

Perhaps the key challenge facing world energy planners is that petroleum remains a dwindling resource. While OPEC members are husbanding their oil reserves in an effort to maintain prices, non-OPEC producers such as the United States, the United Kingdom, and the Soviet Union are depleting their reserves at a record pace. The Middle East currently contains nearly six tenths of the world's proven oil reserves. When non-OPEC petroleum production declines in the nineties, Middle Eastern OPEC members will be back in the driver's seat.

Reduced oil dependence in recent years was made possible by impressive gains in energy efficiency around the world and by the development of alternative energy sources. If oil prices continue to drop, they will soon begin to undermine investments in energy alternatives. Declining prices have already led many countries to cut successful energy programs that would have provided substitutes for oil in the nineties.

The world faces a far different energy challenge today than it confronted in the seventies. We essentially know how long oil reserves will last and what policies work. Thanks to new technologies, the opportunity to develop energy alternatives is greater than ever. Blind faith in monolithic solutions such as synthetic fuels or breeder reactors has fortunately faded. The hard part is continuing the move beyond oil at a time when it is easy to be complacent.

Western Europe, North America, and Japan together account for two thirds of world petroleum use: oil prices of \$35 per barrel in 1981 (five times the level in 1973) led to a historic lowering of oil dependence in industrial countries. Between 1979 and 1984, consumption declined 18% in Western Europe and 16% in both North America and Japan. Oil consumption per unit of gross national product (GNP) — a good measure of dependence on petroleum — fell 36% in the Western industrial countries and Japan between 1973 and 1984.

In the rest of the world, oil consumption rose 7% between 1979 and 1984 despite the intervening economic recession. Most developing coun-

tries started at low levels of usage, have inefficient industrial and transportation systems, and have been unable to afford the investments needed to develop alternative energy sources. Countries with Centrally Planned Economies have also been relatively slow to move away from oil, in part because their economic systems protect industries and consumers from the full brunt of higher prices. But even where petroleum use is rising, it is doing so at a much slower rate than during the seventies.

Between 1979 and 1984, oil imports fell 34% in Western Europe, 40% in the United States, and 26% in Japan. Together, these account for over four fifths of the 31% decline in world petroleum trade during this period. In 1984, the two largest exporters of oil to the United States were its neighbours — Canada and Mexico. The Middle East as a whole supplied just 4% of the oil used in the United States, down from 20% in 1979. Japan, on the other hand, still gets two thirds of its oil from the Middle East.

Adding to competition in world petroleum markets is an increase in non-OPEC oil production of more than 5 million barrels per day since 1979. Over half came from two areas — Mexico and the North Sea. Mexican production has almost doubled since 1979, adding 1.4 million barrels per day to world oil supplies. British and Norwegian production went from near zero in the early seventies to 3.3 million barrels per day in 1984. These countries have become major oil exporters and important counterweights to OPEC in international markets.

Other nations that have significantly boosted production in recent years include Brazil, Colombia, Egypt, Malaysia, and Pakistan. The new oil has provided welcome domestic energy supplies and has improved national trade balances. The Third World has added only 1.3 million barrels per day to the world supply of petroleum, and much of that is used internally. Emerging Third World oil producers have so far had little effect on international oil markets.

The two largest players in the world oil market — the Soviet Union and the United States — have so far staved off anticipated declines in production. Record levels of exploration and drilling caused U.S. petroleum production to rise by 300,000 barrels per day in the early eighties after falling 1.5 million barrels per day in the seventies. Soviet production rose by 500,000 barrels per day between 1979 and 1983, defying Western analysts' predictions of a 15% decline. Together, the two superpowers are daily producing about 3 million barrels more than was expected as recently as 1979.

As oil consumption declined and production in non-OPEC countries increased, far-reaching changes occurred in world oil markets. Once controlled by a cartel of multinational corporations and then by OPEC itself, petroleum markets today are increasingly competitive, shaped more by market forces than by Governmental and corporate decisions. Whereas 95% of the oil traded internationally in the seventies was under long-term contract, today 50-60% is sold on competitive markets at prevailing prices.

Only a small fraction of OPEC oil is now sold at the cartel's official prices. OPEC's share of world oil output has fallen from about half in 1979 to less than 30% in 1985. The major Middle Eastern producers, with the bulk of world reserves, have cut production the most. By early 1985, Kuwait's production had declined 60% and Libya's was down 50%. The Iran-Iraq war has halved oil production in those two countries. Saudi Arabia remains the dominant "swing producer", however, since it has propped up petroleum prices by removing as much as 7 million barrels a day from the world oil market. Saudi Arabia's daily production fell from 10 million barrels in 1980 to 4.7 million barrels in 1984, and to just 2.5 million barrels in mid-1985 — the lowest level in 18 years. By 1985, tension between OPEC members had reached record levels, and Saudi Arabia appeared to be moving toward increased production and the competitive pricing of its oil. If other members respond by raising production and lowering prices, the cartel may well dissolve entirely.

A study by the Oxford Institute for Energy Studies in Great Britain shows that, due to a decline in demand and price, Middle Eastern producers lost close to \$200 billion in oil revenues between 1982 and 1984. This is a serious economic crisis for countries that get 95-100% of their foreign exchange from these revenues and that have based Government spending on overly optimistic projections of such funds.

Many oil exporters — such as Mexico, an ex-officio OPEC member with a \$96 billion foreign debt — face a rising tide of economic troubles as prices fall. Venezuela cut a planned \$2.4 billion public works program by 75%; Nigeria expelled 2 million guest workers. Even wealthy Persian Gulf oil producers have suffered economic problems, including, in the case of Kuwait, a 50% decline in land prices and a 30% fall in office construction. Saudi Arabia's oil revenues have fallen from \$113 billion in 1981 to a projected \$31 billion in 1985. The nation's foreign-exchange holdings dropped from \$150 billion to less than \$100 billion in 1985, and public spending was cut 23% to stem the hemorrhage of capital.

The biggest winner from the shift in oil markets is the United States. The U.S. oil import bill fell from \$61 billion in 1981 to an estimated \$32 billion in 1985. Petroleum accounted for less than 15% of American imports in 1985, down from 34% in 1980. Falling prices have helped cut U.S. inflation to a 4% annual rate, its lowest level in more than a decade. Economists believe that lower oil prices contributed to the record-breaking economic recovery that culminated in a GNP growth rate of 6.8% in 1984. Lower oil prices have caused problems for U.S. oil companies however. During the early eighties, billions of dollars were invested in petroleum exploration and development on the assumption that oil prices would continue upward. Since then, many small companies have retrenched or actually gone out of business, threatening some banks with large oil portfolios.

Other economies have not benefited as much as the United States from the stimulative effect of falling prices. This is because most oil is traded internationally in U.S. dollars, and the value of the dollar in relation to most other currencies rose steadily in the early eighties. While the price of petroleum has declined 23% in U.S. dollars since 1981, its cost in Japan dropped just 11%. In West Germany, the real cost of oil has risen 7%, in India it has gone up 11%, and in France it has risen 38%.

The average price of petroleum products in Europe has continued to rise since 1981. These high prices have hindered economic recovery and made it more difficult to bring down inflation. Since OPEC members import large quantities of goods and services from Europe, they have benefited from the strong dollar, which boosts the real value of their oil sales. Consistently high oil prices also account for the continued weakness of petroleum markets in Europe. The World Bank estimates that oil imports in Western Europe would be 1.7 million barrels per day higher if exchange rates had remained at the 1979 level. The Soviet Union, with a total output of 12.5 million barrels per day (three quarters as much as recent OPEC

production), is the world's largest oil producer and a major player in energy markets. Rising petroleum prices in the seventies boosted the economy significantly, providing 60-75% of its Western "hard currency" earnings. The Soviet Union exports 1.5 million barrels of oil to the world each day, at competitive international prices, so the Soviet economy has been hit hard by recent declines in the world price of this resource.

Eastern Europe, with the exception of Rumania, has little domestic oil and depends on the Soviet Union for 90% of its supplies — close to 1 million barrels per day. Soviet oil sales to its East European allies are based on a pricing formula tied to a five-year sliding average of world oil prices. According to the World Bank, Africa (with the exception of Nigeria) has barely enough petroleum to cover essential needs. Some Governments must take extraordinary measures to pay for oil imports. Cuba reportedly sells sugar to the Soviet Union at 10 times the world price and uses the proceeds to buy Soviet petroleum, part of which it resells on the world market to earn hard currency.

The United States, starting with one of the world's most energy intensive economies, has achieved one of the most dramatic turnarounds. Between 1973 and 1984, U.S. energy efficiency rose 23%, allowing national energy use to average about the 1973 level despite substantial economic growth. Without this increased efficiency, the nation's use of energy in 1984 would have been higher by the equivalent of 10 million barrels of oil per day — about double the oil imports that year. Annual U.S. energy expenditures would have been at least \$100 billion higher. Coal, by comparison, has provided the equivalent of an additional 2 million barrels of oil per day, and nuclear power has accounted for just over 1 million barrels of oil per day.

Western Europe, starting with substantially more efficient economies, realised a 16% decline in its energy intensity between 1973 and 1984. Japan led the world with a remarkable 29% decline in its energy intensity ratio, reflecting concerted efforts by industry and Government to reduce oil dependence. In Greece and Australia, on the other hand, energy intensity actually rose during the past decade. Data compiled by the Organisation for Economic Co-operation and Development (OECD) show GNP in the Organisation for Economic Co-operation and Development (OECD) countries rising 24 percent between 1973 and 1984, while total energy use was unchanged. This indicates a 19% drop in the energy/GNP ratio.

Efficiency improvements stem in part from simple housekeeping measures, in part from structural changes such as the development of energy-intensive service economies or communities where cars are not needed as often, and in part from technological improvements encouraging the development of less expensive and cleaner energy sources. Energy efficiency investments are particularly discouraged by subsidies provided to energy industries. In some cases, energy subsidies may actually encourage greater reliance on foreign petroleum by discouraging the development of more energy-efficient technologies that otherwise would be ready the next time energy prices begin to climb.

The Centrally Planned Economies of Eastern Europe and the Soviet Union face some of the most difficult challenges in reforming energy markets. There, energy efficiency has not improved significantly in the past decade, largely because artificially low prices have insulated consumers and industrial managers from rising world energy prices. The Soviet Union has the world's second least energy-efficient steel industry, lagging behind the efficiency of most Western facilities. Centrally Planned Economies tend to favour large scale projects over changes that require thousands of smaller efforts. The energy inefficiency of the Soviet economy undermines its efforts to compete in world markets, but recent economic reforms appear intended in part to address these problems.

— T.P.S. RAJ

(Condensed from an article by Christopher Flavin entitled "Moving beyond oil" World Watch Institute "State of the World" 1986).

CHEMARENA

S.L. VENKITESWARAN

Trends in Hydrocarbon Industries

A significant pointer is the return to a dollar per gallon level for gasoline in U.S.A. Crude oil prices had advanced faster than product prices and the product prices are now catching up. Crude oil prices are expected to be \$ 20 per gallon early 1988. Net oil imports by U.S. for 1988 are expected to be 6 million bpd and petroleum demand 16.4 million bpd. Oil usage worldwide will be flat. North Sea and American Oil production has started to decline and OPEC oil export will rise by a million bpd in 1988. For OECD countries as a whole consumption may be over 35 million bpd -- 1% rise but stocks for near 100 days can help face any crisis situation in Gulf.

Oil imports into Europe was 33% of total (a fall of 3%) and UK's exports of oil to Europe was 25 million tons. No serious situation could arise in 1988 but the effect on prices due to dollar decline is uncertain at this time. World L.N.G. demand is up and US demand reached 18.1% Tcf. World L.N.G. trade is 1.76 Tcf and prices have dropped. Three top importers are Japan, France and Belgium while three top exporters are Indonesia, Algeria and Brunei.

World's ethylene business is back to profits and improving. Plants operate at over 90% of capacity due to fall in capacity in recent years by nearly 25%. Number of producers has also dropped. European demand is set at 12.5 million tons in 1986 with rise in PVC, LDPE, LLDPE and HDPE. The pressure on capacity may become acute in a year or two. Overall recovery in the petrochemicals is a strong factor with rise in polypropylene and acrylonitrile being the highest. Polypropylene demand is estimated at 8.4 million tons world-wide in 1986 with growth at 7% a year from 1979. Acrylonitrile demand is 3.5 million tons world-wide in 1986 and 68%

of this goes for fibre use. The price forecast for oil is said to be a juggler's job with many uncertainties and unpredictable political situations. The Gulf War continues and has led to attacks on oil tankers and even threats to the closure of the Hormuz straits but these are not yet too serious to upset oil supplies. In any case the too warring countries want the revenues badly so that they cannot afford disruption in supply. Saudi Arabia and Iraq have oil pipelines as alternatives. But a sense of complacency is not justified though the stocks built up in the past years provide a big margin of safety. Gulf States exported 945 million bpd of which 780 is to OECD.

But most promising for the near future is the outlook on petrochemicals. The modernising, debottle-necking, stream-lining of business areas, restructuring and acquisitions and swaps have greatly helped. BP Chemicals took over ICI's polyethylene business and is one of the world's largest producers. Finland's Nesly OY has come to the rescue elsewhere. ICI's take-over of BP's PVC as a swap has stabilised the position and ICI has also taken over Lonza's PVC as well. Dow Chemical has held on to its main products unscarred and expanded or modernised besides going into urethanes. Du Pont has also maintained its leads in specialities for electronics, aero-space industry, carpet fiber, advanced materials for automobiles etc. The German Big Three continue on top with their division of interests and little of internal competition. The Middle East ventures have not proved to be a serious deterrent even to European production. Many old plants are modernising, reducing energy inputs, introducing flexibility of operations to keep ahead. Environmental and safety standards are being maintained and the image of chemistry and chemical industry is being built up through public relations. All in all the future continues bright for petrochemicals.

Plastics in Packaging

The surge in the use of plastics continues and newer materials such as multilayer films and the advent of PET and innovative methods of packaging have been the factors. Between 30 and 40% of thermoplastics end up in

packaging in Western Europe, U.S.A. and to a lesser extent in Japan. End use markets increased steadily and plastics make inroads into other materials -- paper/board, glass, tinplates used in packaging. The relative

share of the material in USA and Europe in 1985 is reported in the following table:

TABLE

	U.S.	Europe (W)
Total (Mill. Tons)	54%	41.6%
Paper+Board	47%	42%
Glass	29%	34%
Tinplate	12%	10%
Plastics	09%	13%
Aluminium	03%	01%

US consumers use twice as much per capita as W. Europe and higher portion of paper and board and aluminium. In the USA 90% of beverage cans are aluminium while in W. Europe it is only 36%. PET has been the material of choice for large packs. Although plastics have a nearly 13% share of the packaging market in W. Europe, it is expected to go higher to 18% in 1995 in a total of only 40.9 million tonnes (a fall from 41.6 million tonnes of 1985). The gain of plastics will be at the expense of glass and tinplate. It is reported that the inte-

grated facilities for package manufacture by the consumer -- in-house package fabrication -- is helping in the increase, besides the overall cost advantage.

But the major problem is of solid waste disposal with the thousands of tonnes plaguing small towns. Increasingly the local administrations are tending to come down heavily on plastics waste -- much of it arising from "fast food" production and services. In the USA the Clear Environment Movement is more vociferous.

A recent Bill of the US Senate prohibits the disposal of plastic waste in US water and by US ships anywhere. Non reusable beverage packing is one of the major contributors for the solid waste and the newer innovative multilayer packaging comes in the way of recycle of the material. The next decade up to AD 2000 may provide for more legal hurdles on plastics used in packaging where the wastes are too heavy a burden on the community.

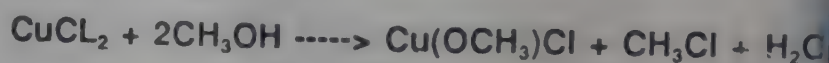
India, by contrast reuses most of the plastic film wastes in a variety of ways with the varieties of plastics bottles adorning domestic shelves.

Dimethyl Carbonate

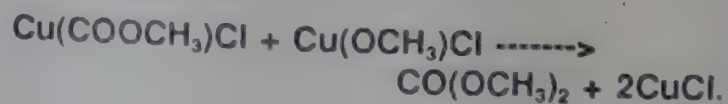
Dimethyl carbonate has been suggested as a replacement for phosgene and dimethyl sulfate, both of which are very hazardous toxic chemicals. A new method of synthesis of dimethyl sulfate is reported by researchers of Dow Chemicals, USA. The process is a vapor phase oxidative carbonylation using copper catalysts -- mainly copper chloride -- and Dow Chem have developed better catalysts viz. cupric chloride supported on activated carbon and promoted by variety of other metal chlorides.

Activated carbon is impregnated with anhydrous cupric chloride to contain between 4.9 to 21.3% of copper. Promoters include potassium, magnesium or lanthanum chlorides and the catalysts can be readily regenerated in use. Being a solid phase reaction the earlier use of slurry catalyst in liquid phase resulting in corrosion is avoided.

The reaction is said to be



The methoxy copper chloride is then carboxylated at the Cu-O bond to form labile carbomethoxide group which then couples with another methoxy group to form dimethyl carbonate and cuprous chloride



The cuprous chloride is readily oxidized separately to cupric chloride by molecular oxygen and then remethoxylated with methanol. The possible commercial applications of dimethyl carbonate are yet to be developed

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baroda hydrocracker unit by '92

India's first hydrocracker unit, described as the latest and most sophisticated secondary processing facility, is being set up by the Indian Oil Corporation (IOC) at the Gujarat Refinery in Baroda at a cost of about Rs. 635 crores.

The unit, with an annual capacity of 1.2 million tonnes, will be commissioned in 1992 and will upgrade residual oil into high-value middle distillates like kerosene and diesel oil for which there is an ever-increasing demand in the country.

Simultaneously, the capacity of the refinery — the largest of India's 12 refineries — is being raised from the present level of 7.3 million tonnes per annum to 9.5 million tonnes by August as part of a Rs. 30-crore expansion scheme.

Journalists who visited the refinery were told by its chief general manager, Mr. T. S. Krishnamurthi, that work on the hydrocracker unit had already commenced, with civil works like site grading and construction of an office complex currently in progress.

Once the expansion is completed, the refinery will be fully geared to process the additional two million tonnes of heavy crude oil that the Oil and Natural Gas Commission (ONGC) plans to make available from its north Gujarat fields by 1990.

At the stage, the refinery will be handling nearly five million tonnes of the heavy north Gujarat crude, which will produce about 3.2 million tonnes of residual oil. Conversion of heavy stocks into high-valued products through secondary processing has become economical because of the wide difference in their prices, Mr. Krishnamurthi said.

That is where the hydrocracker unit comes in, spread over 50 hectares, the project will be self-contained with units for feed preparation, hydrogen generation, hydrocracking and sulphur recovery.

The hydrocracker unit will also have a captive thermal power plant to be set up by Bharat Heavy Electricals Limited. Engineers India Limited are

prime consultants for the entire project. It will also have a modern effluent treatment plant.

IOC has signed an agreement with Chevron Research Corporation of the United States who will provide licence process design and the catalyst for the unit, Mr. Krishnamurthi said.

The hydrocracker unit is coming up besides another secondary process facility, the fluid catalytic cracking unit (FCCU), which was set up in 1983 and is currently in operation with an annual capacity of 1.2 million tonnes.

Apart from being inadequate to absorb the entire residual oil when the refinery is expanded, the FCCU field was only around 45 per cent of middle distillates while the hydrocracker will yield around 80 per cent, Mr. Krishnamurthi said.

Other advantages of the hydrocracker unit are that it will produce large quantities of aviation turbine fuel and its products are of a premium quality. It also completely eliminates the heavier ends unlike the FCCU, Mr. Krishnamurthi said.

Set up in the mid-'60s with Soviet assistance as the fourth of IOC's six refineries, the Gujarat Refinery today can process different types of crude oil from Ankleshwar, Gandhar, north Gujarat, Bombay High and varieties of imported crude, he said.

The refinery originally had an annual capacity of three million tonnes, with three units of one million tonnes each. These were revamped in the early '70s to go up to 4.3 million tonnes.

In 1978, another three million tonne unit was set up to process Bombay High and imported crude. This expansion project had a foreign exchange component of only ten per cent, Mr. Krishnamurthi said.

Earlier, an udex plant was commissioned in 1969 to meet the demand for benzene and toluene for various petrochemical and chemical industries in the region. Pilot distillation facilities for production of N-heptane, which was till then being imported, and aluminium rolling oil were also added.

Today, the refinery produces a wide range of products like liquified petroleum gas (LPG), naphtha, benzene, motor spirit, kerosene, high speed diesel. It also produces 350,000 tonnes of aviation turbine fuel per year.

The refinery today supplies almost an entire range of feedstock to the Indian Petrochemicals Corporation Limited (IPCL) — the country's largest petrochemicals complex. It also supplies feedstock to the Gujarat state fertiliser companies, Mr. Krishnamurthi said.

About the refinery's performance, Mr. Krishnamurthi said it had achieved more than 100 per cent capacity utilisation in the last three years through better preventive maintenance, improved operational practices and constant upgradation of technology.

During the first nine months of the current financial year, the refinery processed 6.3 million tonnes of crude and hopes to process another two million tonnes in the remaining three months.

In 1987, the refinery produced 197,000 tonnes of LPG, 1.1 million tonnes of kerosene, more than half a million tonnes of motor spirit and 2.8 million tonnes of high speed diesel oil, besides achieving a record filling of 6.9 million cylinders of LPG.

About 1.2 million tonnes of the refinery's products are pumped through the Koyali-Ahmedabad pipeline while the rest is moved mainly through tank wagons. More than 650 rail tank wagons are loaded daily with different products. About 450 tank lorries are also loaded every day.

During the seventh plan period, the refinery has implemented energy saving schemes worth Rs 21 crore, including the replacement of old furnaces with new ones with better thermal efficiency.

When on-going schemes worth Rs. 19 crore are completed, 23,500 tonnes of additional fuel oil worth Rs 3.5 crore would be saved, Mr. Krishnamurthi said.

Apart from the Rs 10-crore pollution control facility set up at its inception, the refinery also has plans to spend about Rs 27 crore on automatic air monitoring, and desulphurisation of fuel gases.

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national alcohol authority mooted

The all India Alcohol-based Industries Dev. Assn. (AABIDA), has called upon the Government to create a national alcohol authority with adequate statutory powers to control and regulate distribution, allocation and movement of molasses and alcohol, and bring about uniformity on these two vital industrial feedstocks.

Addressing a news conference in New Delhi Mr. P. M. Kavadia, Vice-President of the Association, said the national alcohol authority could replace the Central Molasses Board which was only an advisory body with no powers to implement its recommendations.

He also wanted the allocation, distribution and movement of molasses and alcohol to be permitted without any inter-state restrictions or export or import fees.

The Association wanted molasses to be used only for industrial alcohol which was the mainstay for a large number of chemical industries in the country. No new potable alcohol units using molasses should be licensed.

In this connection, the Association strongly opposed the proposal to set up methanol-based acetic acid plants in the country. There were already 22 alcohol based acetic acid units with an installed capacity of over one lakh tonnes against the current demand of about 70,000 tonnes.

Mr. Kavadia, wanted the Government to encourage setting up of medium size alcohol-based industries with moderate investments of a few crores all over the country instead of monolithic plants with huge investments at limited locations. Wide dispersal of alcohol-based chemical units was in the national interest, he said.

The Association was also opposed to the import of organic chemicals under OGL. Since almost all the organic chemicals based on alcohol were available in adequate quantities, States should be persuaded to make full allocations of alcohol to the manufacturing units in the country so that they could work to their optimum capacity and avoid the need for imports in future.

Mr. Kavadia felt that the sugar industry in India was poised for a rapid growth. By the end of the Seventh Plan, India might touch a production of 45 to 100 lakh tonnes of sugar which could give 45 lakh tonnes of molasses that could yield 1000 million litres of alcohol. If a sound strategy to utilise this alcohol was adopted, the alcohol-based industries could get a boost, he observed.

A FAIR DEAL

It is obvious from the proceedings of the annual meeting of the Central Molasses Board (CMB) that the Union Government is keen to give a fair deal to alcohol-based industries. Both the Union Minister for Industry, Mr. J. Vengal Rao and the Union Minister of State for Chemicals and Petrochemicals, Mr. Jaichandra Singh, took surplus States such as Uttar Pradesh and Maharashtra to task for creating an artificial shortage of alcohol. Mr. Singh stated that "stocks of molasses were rotting in surplus States but they would not allot the material to deficit States." Even as chemical units in deficit States are starved of industrial alcohol, their basic raw material, distilleries in Uttar Pradesh are burdened with a huge surplus of molasses. Distilleries are naturally anxious to export alcohol. Both surplus and deficit States must share the blame for this unhappy state of affairs. As CMB is not clothed with adequate powers to force surplus States to supply the material to deficit States, allocations made by it largely remain on paper. Not surprisingly, therefore, Mr. Vengal Rao did not rule out the possibility of the Union Government assuming more powers to effectively control distribution of molasses. It is possible that such a course of action might give rise to constitutional hassles. The Union Government can, however, adopt certain other measures to make State Governments fall in-line with its wishes. Mr. Rao and Mr. Singh indicated that the Union Government would not hesitate to ban exports of molasses and industrial alcohol and permit even duty-free imports of these materials by actual users. If the Union Government means business, it should ensure that

this does not remain an empty threat. The Union Government ought to take a firm stand on the issue, especially because both surplus and deficit States are inclined to treat industrial alcohol as a milch cow rather than as an essential industrial raw material. Expert committees appointed by the Union Government from time to time unanimously recommended that State levies on alcohol should be drastically reduced to enable alcohol-based industries to operate viably. The Union Government itself has softened the blow of the enhanced price of molasses by granting a rebate of the Central excise duty.

Significantly, the firm stand taken by Mr. Rao and Mr. Singh on allocation of molasses produced an immediate impact. Representatives of the Uttar Pradesh Government promptly that they would consider a reduction held out an assurance at the meeting in the "export pass fee". Rationalisation of State levies is not enough. It is equally essential that the Union Government itself should review its policies on production and imports of alcohol-based chemicals. Domestic producers of acetic acid, for example, are upset over the Government's move to permit the setting up of methanol-based acetic acid plants. The industry has pointed out that "already there are 22 widely dispersed alcohol-based acetic plants" with a total capacity of around one lakh tonnes against the current annual demand of 60,000-70,000 tonnes. As the country is expected to produce about 45 lakh tonnes of molasses giving about 1,000 million litres of alcohol by the end of the Seventh Plan the industry feels that there is no justification for putting up methanol-based acetic acid plants. Significantly, Mr. Vengal Rao has agreed to reconsider the issue of permitting methanol-based units. This has assumed urgency as the Government is determined to remove restrictions on inter-state movement of molasses and alcohol and lower the burden of State levies on them for helping alcohol-based industries.

Inadequate capacity may entail huge forex outgo

Inadequate refining capacity is likely to prove costly for the country in the coming years.

It may cause heavy drain on the country's foreign exchange for larger imports of petroleum products in addition to crude oil, according to oil industry sources.

The country's current refining capacity is only 47.8 million tonnes. The figure is expected to increase to 51.5 million tonnes after the expansion of the Mathura refinery by 1.5 million tonnes and Gujarat refinery by 2.2 million tonnes this year.

According to the current official assessment, the total refining capacity is to increase to 51.5 million tonnes by 1989-90 and to about 61 million tonnes by 1994-95.

With this, the overall petroleum product deficit would grow from present level of four million tonnes to eight million tonnes by 1989-90 and 21 million tonnes by 1994-95.

This order of petroleum product imports, oil industry sources pointed out, would pose serious problems, apart from difficulties in their availability and price increases in the international oil market.

Therefore, it is urgently necessary for the country to develop indigenous refining capacity to meet at least 80 per cent of the requirements of petroleum products from indigenous sources. Refining crude indigenously whether domestic or imported, is a more efficient strategy in meeting the domestic demand as compared to higher levels of import of petroleum products.

To meet this objective, the country would require a total refining capacity of 75 million tonnes by 1994-95 and 100 million tonnes by the turn of the century.

This would require creation of additional refining capacity of 14 million tonnes by 1994-95 and 35 million tonnes by the turn of the century.

The above refining capacity would be required to be created on the assumption that the annual increase in demand of petroleum products will continue at the present level of 6.3 per

cent per annum till 1994-95 and decline to above five per cent thereafter.

The total capital investment required for additional refining capacity, crude and products tankages and various other distribution facilities during the period till the turn of the century is estimated at about Rs. 25,000 crores at current prices.

On the refinery front, the country is likely to experience the crunch during the next financial year, when the consumption of total petroleum products is expected to be 49 million tonnes — an increase of three million tonnes.

A refinery throughput of 52 million tonnes is necessary for producing about 49 million tonnes of products. Even with the Mathura and Gujarat refineries completing their debottlenecking and expansion schemes, the refining capacity can at best rise to only 51 million tonnes. The problem will be more acute during the Eighth Plan as the Karnal and Mangalore refineries,

still on the drawing boards, are likely to take shape only by the end of the Plan.

The Karnal and Mangalore refineries will add only another nine million tonnes by 1994-95, still leaving a gap of 14 million tonnes. The "Assam accord refinery" with a capacity of two million tonnes is yet to receive Government sanction.

As the setting up of a refinery requires a lead time of four to five years. The Government could sanction immediate expansion of coastal refineries including Visakhapatnam, Madras, Cochin and Haldia in addition to the modest expansion of Digboi and Bongai-gaon refineries to bridge the widening demand-supply gap in availability of finished products, sources said.

The Government has recently set up a study group to recommend creation of additional refining capacity to match the demand of petroleum products.

Meanwhile, the capital investment required for a new refinery has increased tremendously. In 1982, IOC established the six million tonnes refinery at a cost of Rs. 251 crores while the investment for similar capacity refinery at Karnal will be Rs. 1258 crores — a six-fold increase in just six years.

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molasses distribution

The proposed legislation to control the distribution of molasses from sugar factories to distilleries could well create as many problems as it hopes to solve. The states with surplus molasses (Maharashtra and U.P. in particular) have levied substantial pass fees for supplies to deficit states. Indeed they would rather hold on to stocks than reduce the pass fee. According to the Union minister of state for industries, Mr. Vengal Rao, last year nearly 30 per cent of Uttar Pradesh's stock of molasses deteriorated. And there have been complaints from some deficit states that the yield from molasses allotted to them was less than half the standard yield of alcohol. It is to correct this distortion that the Central government would now like to take over the distribution of molasses.

Any industrial input like molasses which tends to be diverted to the illicit distillation of potable alcohol can hardly be left free of distribution control. The pull of the non-industrial market is such that in the absence of

control, industry will be starved of the input it needs for the production of industrial alcohol. The question is whether Central control will work in practice. It will not be easy for any Central agency to estimate the requirements of each state. This task will be made even more difficult by the fact that the deficit states usually provide exaggerated estimates of their needs. Central control bristles with difficulties, but needs to be given a try. Inadequate supply of inputs like molasses does not seem to be a major constraint. Industry did succeed last year in reaching the anticipated production level of 7,000 lakh litres, but demand had slumped primarily owing to the poor inter-state offtake of alcohol.

What is needed in the long term is a strategy which rationalises the pattern of use of molasses and leaves the door open for import of industrial alcohol. The Union minister of state for chemicals and petrochemicals, Mr. R. K. Jaichandra Singh, has already proposed that duty-free alcohol imports

may be allowed. This deserves attention. Such a step will ensure the speedy disposal of excess production surplus states across their borders.

— The Economic Times

AIMO SEEKS CUI IN COPPER PRICES

The All-India Manufacturers Organisation (AIMO), DHP board has decided the failure of the non-ferrous metals pricing committee to reduce copper price in tune with the fall in international prices.

According to the DHP board AIMO, London metal exchange copper prices fell by £250 (about Rs. 6,000 per tonne within a month, the consequent decline in MMTC copper price should have been between Rs. 12,000-15,000 per tonne since the rupee has also gained vis-a-vis pound sterling.

The board says there is no justification for MMTC not to reduce price accordingly particularly because it raises the prices promptly when global prices go up. Nickel prices, for example, were hiked by as much as Rs. 40,000 on the plea that international prices had gone up.

The board has reiterated the demand made by the joint committee of national body of industries comprising AIMO, FASSI and NAYE, to introduce a pool pricing system for copper since 50 per cent of the requirements is met by domestic copper producers.

SEMINAR ON 'PLASTICS IN RURAL ECONOMY'

The All India Plastics Manufacturers Association has organised a Seminar on 'Plastics in Rural Economy' at Aurangabad on February 20. The object is to focus attention of the rural and urban people about the various applications of plastics and to create awareness amongst the people in the rural areas about the role the plastics industry is playing in the economy and how its benefits can reach them.

The topics to be covered include Plastics in Agriculture; Drip Irrigation; Canal Lining/CAP tarpaulins; Economy of PVC pipe — Scope and limitation in India and Bio gas for rural India. This would be the first time such

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RESEARCH & DEVELOPMENT

DETECTOR

Following the work carried out in the French National Institute of Agronomic Research INRA, a French company has recently manufactured and marketed the Truitotest, an apparatus to detect accidental chemical pollution in water. The pollution detector is a small trout fish. This ultrasensitive apparatus is simple in its principle and even a non-specialist can use it.

The trout detects the pollutant; but it reacts also to the sudden accumulation of small amounts of pollutants which would otherwise have escaped unwarned with the traditionally used detectors limited to the checking of only one physical or chemical parameter).

The system includes a 50 cm diameter funnel which receives the water to be checked. A small trout swims in the funnel, upstream, at the surface

But if there is pollution, the fish becomes fatigued and dies. The circulating water brings it downwards and it blocks the drain and an alarm is triggered off.

This biological test can be conducted wherever there is a need for checking the quality of water. It can be installed at the inlet and outlet of drinking water treatment plants and at the outlet of industries discharging water into natural environment.

For further information contact Societe Hermann Moritz, Chassant 28480, Thiron Gardais, France Institut National de la Recherche Agronomique, Saint-pee-sur-Nivelle, 64310, Ascaïn, France.

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For further information contact Advani-Oerlikon Limited, Post Box No 1546, Bombay-400 001.

CONDENSATE PUMP

A compact condensate pump which operates almost silently, yet can give a total lift of more than nine m, has been developed in Britain (EDC International Ltd., 24, Horseshoe Park, Panbourn, Reading, Berkshire, England RG8, 7 JW).

The 'Waterway Master Pump', from EDC International, is smaller than most rival products and can be fitted inside most air-conditioning units. The low profile sensor head is also smaller and has, instead of a float switch, an electronic alarm-level probe that can switch off the air-conditioning system if the water level exceeds the normal height in the condensate tray.

A 'Whisperswitch' control allows the installer to select between pumping capacity and sound level. In whisper mode the pump will lift water to full three m while at full capacity it can lift up to nine m. The pump is self-priming and can lift up to 75 litres/h.

The specially designed compact housing isolates electrical circuits from pump and water circuits for extra safety, and a rubber baseplate, which absorbs noise and vibration, also permits mounting directly on to almost any surface. The pump is available in either 220-240V, 50 Hz or 110 V, 60 Hz.

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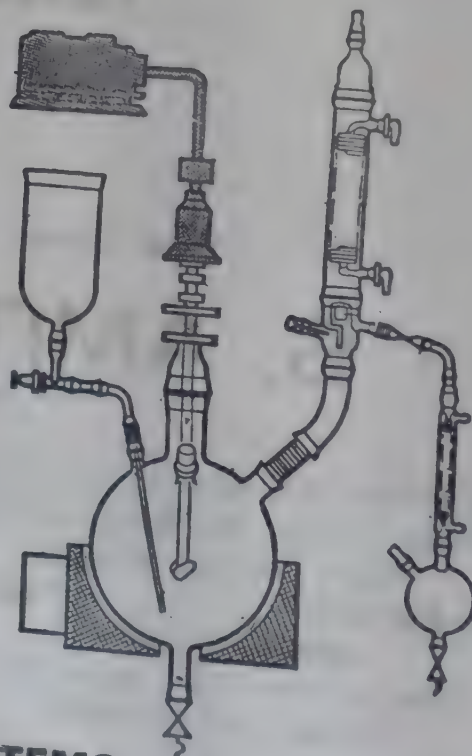
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PCBL signs technology pact with Columbian Chemicals

Phillips Carbon Black Limited (PCBL) which has signed a technology agreement with Columbian Chemicals of the USA for the purpose of all round upgrading of its Durgapur plant will jointly explore the possibility of setting up carbon black units in third world countries. Following the signing of the agreement, Mr. P.K. Gupta, vice chairman, PCBL, a company within RPG Enterprises, told newsmen that it should be possible for the two companies to identify the countries where joint ventures could be set up within six months.

While the technology agreement relates to rubber carbon black of which PCBL is the largest manufacturer in the country, Columbian Chemicals also claims to have the best of technology in industrial carbon black and synthetic iron oxide, PCBL, said Mr. Gupta, could seek Columbian technology at a future date to broaden its product base.

Incidentally, Columbian Chemicals is now a subsidiary of Phelps Dodge, USA with a turnover exceeding \$1

billion, with Phelps Dodge, RPG Enterprises has nearly a two decade relationship through Asian Cables Corporation.

It became necessary for PCBL to look around for a technical collaborator following the selling out of worldwide interest in carbon black business by Phillips Petroleum Co. of the USA which in the early sixties promoted PCBL along with the Duncan House. Phillips Petroleum is in the process of disinvesting its 30 per cent equity stake in PCBL among the existing shareholders at a price of Rs. 26.75 per share. The present market quotation of the PCBL share is around Rs. 37.

Mr. Gupta informed that in the next three years, PCBL with the aid of Columbian technology would "totally modernise" its Durgapur plant. Modernisation would result in "product quality improvement, substantial energy conservation and improved control of pollution" allowing PCBL to maintain its leadership in carbon black business. PCBL presently has a capacity to manufacture 40,000 tonnes of carbon black a year.

That the country has developed surplus capacity in carbon black will be evident from the fact that the industry as a whole could at the most utilise 65 per cent of capacity. The demand growth for the chemical is around 5 per cent per year. It is, therefore, important that India develops an export market for carbon black.

Giving some details of the technology agreement, Mr. Gupta said PCBL would make a lumpsum payment of \$ 750,000 and also pay a royalty of 2 per cent on carbon black sales to Columbian Chemicals.

Mr. Harsh Vardhan Goenka, chairman, RPG Enterprises, who was present said that his Group was in the process of promoting two ventures, each involving an investment of Rs. 15 crores. In collaboration with Texaco Deutsch, the group is setting up a solvent plant in Tamil Nadu. Sulzer of Switzerland has teamed up with RPG Enterprises to set up a hi-tech engineering company in Pune. In this venture, Sulzer will have a 40 per cent equity stake.

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Higher budget backing for 5 state drug units likely

The five public sector enterprises in the drugs and pharmaceuticals sector are expected to get substantially higher budgetary support in the next financial year. The Department of Chemicals and Petrochemicals has sought a Budgetary support of about Rs. 23 crores for them, during 1988-89 against Rs. 16 crores for 1987-88. However, the actual budgetary support was more than this amount.

For instance, Indian Drugs and Pharmaceuticals Ltd. (IDPL) was given a budgetary support of Rs. 4 crores for its plan schemes. However, the Department of Chemicals and Petrochemicals has so far released Rs. 7.3 crores. The Budget provision for IDPL in 1988-89 is targeted at Rs. 9.5 crores.

IDPL's accumulated losses at the end of March 31, 1987 is estimated at Rs. 226.43 crores and the loss during 1986-87 was about Rs. 50 crores. With five units in Rishikesh, Hyderabad, Muzaffarpur, Madras and Gurgaon, IDPL employs about 13,000 persons and with the implementation of the rehabilitation plan it has brought down its cash losses to Rs. 7.98 crores in the first nine months of 1987-88.

Hindustan Antibiotics Ltd. (HAL) was given a budgetary support of Rs. 6 crores for 1987-88 of which Rs. 5.25 crores has already been released. The Department has sought a provision of Rs. 3 crores for 1988-89.

Its accumulated loss up to March 31, 1987 is estimated at Rs. 37.6 crores while its loss during 1986-87 was computed at Rs. 8.08 crores. With 2,647 employees the HAL plant produced penicillin, streptomycin, ampicillin, gentamycin, hamycin and aureofugin valued at Rs. 50.25 crores during the first nine months of 1987-88.

Its sales during this period were estimated at Rs. 42.27 crores and it earned a cash profit of Rs. 2.01 crores. However, it incurred a net loss of Rs. 42 lakhs, while its inventory level was estimated at Rs. 13.32 crores as at the end of December 31, 1987.

Bengal Immunity Ltd. (BIL), was given a budgetary support of Rs. 3 crores in 1987-88, of which the Department has so far sanctioned Rs. 2.2 crores. The provision proposed

for BIL during 1988-89 is Rs. 3.8 crores.

BIL's accumulated loss from 1984-85, when it was nationalised, to 1986-87 is Rs. 11.6 crores and the loss in 1986-87 was Rs. 4.62 crores. With 2,000 employees, BIL manufactures sera anti venum and chloroquin phosphate from its plants in Calcutta and Dehradun. According to the public sector unit its production and sales, estimated at Rs. 2.73 crores and Rs. 4.89 crores, respectively, in the first nine months of 1987-88, are not satisfactory. The poor performance is attributed to non-availability of working capital, which has been eroded due to continuous cash losses.

BIL's cash loss and net loss in April-December 1987 are estimated at Rs. 3.55 crores and Rs. 4.81 crores respectively. Its inventory level as at the end of 1987 calendar year is valued at Rs. 35.3 crores.

The budgetary provision for Bengal Chemicals and Pharmaceuticals Ltd. (BCPL) in 1987-88 was Rs. 2.5 crores. The Department has so far released Rs. 2 crores as Plan loan and Rs. 50 lakhs as non-plan loan. The budget provision for 1988-89 has been targeted at Rs. 3 crores as non-Plan loan and Rs. 2.39 crores as Plan loan for investment for this unit.

BCPL, with 1,875 employees, has an accumulated loss of Rs. 25.97 crores from 1980-81, when it was nationalised, to March 1987. Its loss during 1986-87 was Rs. 5.77 crores. Its production of chemicals, home products and drugs during April-December 1987 was estimated at Rs. 8.72 crores against a target of Rs. 15 crores. The reason for lower production has been attributed by the company to the lack of adequate working capital. Its cash loss in this period was estimated at Rs. 2.76 crores against a net loss of Rs. 5 crores. Its inventory as at the end of 1987 was valued at Rs. 1.5 crores.

Smith Stanistreet Pharmaceuticals Ltd. (SSPL), the third of the nationalised Bengal-based drug units in the public sector, was given a budgetary support of Rs. 1 crore for 1987-88, of which the Department has so far released Rs. 75 lakhs. A

provision of Rs. 1.5 crores has been proposed for the next financial year.

SSPL's accumulated loss is estimated at Rs. 4.65 crores, since its nationalisation in 1977. It manufactures formulations such as non-spirituous cream ointments at its two plants in Calcutta and Bangalore with a total workforce of 1,088. Its loss in 1986-87 was estimated at Rs. 94.27 lakhs and Rs. 1.75 crore respectively.

Its production and sales at Rs. 5 crores and Rs. 5.96 crores, respectively, in this period were lower than the targets of Rs. 8.05 crores and Rs. 8.9 crores. Its inventory as on December 31, 1987 was valued at Rs. 2.32 crores.

FICCI AWARDS ANNOUNCED

The Bharat Heavy Electricals Ltd. (BHEL) and the Defence Metallurgical Research Laboratory (DMRL) Hyderabad, have won the FICCI awards 1987 for research in science and technology for their outstanding contributions.

BHEL gets the award for the development of products of use in power plants, such as micro-processor based boiler simulators, programmable controllers, autosynchronisers and thyristorised inverters. The DMRL receives it for developing aircraft brake pads, heavy alloy anti-tank steel ammunition cores and materials of defence and other uses, according to the awards announced in New Delhi.

For environment conservation:

The Neyveli Lignite Corporation Ltd., Neyveli, bags the award for environment preservation and pollution control for reducing dust through electrostatic precipitators, undertaking soil reclamation and afforestation and utilising the waste in its briquetting and carbonisation plant.

A cash award for Rs. 50,000 in physical sciences including mathematics has been bagged jointly by Dr. R.A. Mashelkar of the National Chemical Laboratory, Pune, for his computer simulation of chemical/polymer plants for productivity improvement and technology absorption and Dr. Ajay Shrinivas Divatia of the Bhabha Atomic Research Centre, Calcutta, for his contribution in constructing the variable energy cyclotron, evolving a helium recovery scheme from the Bakreswar hot springs and installing the Graaf accelerator at BARC, Bombay.

Fall in foreign collaborations

Foreign collaboration cases approved in 1987 showed a declining trend from the peak level of 1,024 in 1985 to 957 in 1986 and 720 in the first 11 months of 1987.

There has also been a reduction in the quantum of financial participation in these collaborations from Rs. 26 crores in 1985 to Rs. 107 crores in 1986 and Rs. 62 crores between January and September 1987.

The number of financial participation proposals has increased over the last two years though the quantum is not commensurately rising. These investment approvals have been mostly for small companies which seek technology transfer.

In the seven years, 1980-86 a total of 5,000 collaborations had been concluded with various countries including the United Kingdom, USA, West Germany, Japan, Switzerland, France and Italy and with the NRIs. The United States, UK and West Germany cannot have more than 40 per cent of these collaborations.

According to the Indian Investment Centre (IIC), the maximum number of technology transfer and financial investments over the last two years has been from the United States.

There has also been a substantial rise in the number of collaborations with Federal Republic of Germany. Japan and Italy are also increasing their presence.

The US investments in collaborations rose from an average of Rs. six crores in the early 1980s to Rs. 39 crores in 1985. Investments by American companies in 1986 was Rs. 29 crores and Rs. 17 crores in the first nine months of 1987.

More than half of the Indo-USA collaborations in recent years are in high technology products and the major areas are electrical equipment, electronics, chemicals and industrial machineries.

Although the foreign investment policy continues to remain selective and confined to high technology areas and export ventures, the Government has indicated willingness to make a more flexible approach in regard to terms of foreign collaborations on a case-by-case basis.

This is apparently in view of the need to accelerate modernisation of

industry to make it competitive and achieve an higher export growth at a time when India is having resource constraints both domestic and external.

DRUGS FOR EXPORT SEPARATE LICENCE PROVISIO SCRAPPED

The Union government announced elimination of the need for specific permission or separate licence for production meant specifically for exports in the pharmaceuticals sector. This facility will also be available for Fera companies.

According to an official press note, the facility will be available subject to three conditions. Firstly, there will be no additional investment on plant and machinery and secondly, the minimum value addition for export production will not be less than 20 per cent when imported raw materials or intermediates are used.

Thirdly, manufacture of items for export will be undertaken only

against firm export orders and the entire production will be exported. No portion of such items, it is stated, can be marketed within the country and documentary proof of export of the entire production will have to be furnished to the department of chemicals and petrochemicals and the commerce ministry.

The drug policy announced in December 1986 envisaged total flexibility to produce any product for export within the existing facilities of manufacturing units. The present decision to exempt pharmaceuticals from industrial licensing provisions for purposes of export production will enable industrial undertakings to avail of this facility under the policy.

The press note says that industrial units, must keep the department of chemicals and petrochemicals, DGTD and the drugs controller posted with details of production and exports.

Industrial units covered under the MRTP Act will have to submit a memorandum to the department of company affairs for the purpose of record.

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Frankly Speaking

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Japan—Miracle, But.

Japan is the only new economic great power to emerge till now in this century. But the country is now at cross roads facing some hard choices, the subject of an exhaustive article ('Japan's Choices', Foreign Affairs, 923-941) by the management Guru, Peter F Drucker.

It has become clear that their export boom with tremendous trade surplus cannot go on forever. Their industrial strategy which has served them well in the last 30 years seems obsolete in today's global context. Changing the strategy from imitating to 'outflanking' the West and going 'international' may not fit in with Japan's basic economic policy and the tradition of lifetime employment. So far, Japan has had a unique combination of the normal low labour cost of a developing country with the very high labour productivity characteristic of a developed country. This helped Japan achieve export boom in the labour intensive smokestack industries, e.g., steel, automobiles, shipbuilding and later consumer electronics. This phenomenon is now being repeated elsewhere, by South Korea, Brazil and even Mexico. To counter Japan's onslaught in the international market, the West resorted to intensive training and management as also automation to obtain production costs even lower than that possible with the lowest labour wages. Perhaps Xerox, having lost its ground to Japan for copiers, were the first to automate, and regained much of the lost ground—at least at home. Others such as RCA, GEC and even the Swiss watchmakers followed suit and succeeded.

Knowledgeable Japanese realise that their export boom has already peaked, and their trade surplus may soon disappear or at least shrink sharply. The export boom was basically a result of imitation strategy and adversarial trade, by taking business away from firms already in trouble thus creating a major economic damage

and social dislocation. The boom had also created a false sense of economic well-being and security. Substituting the insatiable markets of China for the losing markets of the West has proved to be a mirage. Japan's dilemma, now how to integrate itself into the world economy. Three defensive strategies and major offense approach, as follows, are seen as the answer:

- * Compete on basis of quality rather than on price, as hitherto
- * Rapid automation to compete with newcomers such as South Korea
- * Go multinational, by moving production to the markets
- * Outflanking the West, specially in the United States.

Going multinational has been difficult due to language barrier, culture and tight cohesion of Japanese society, but some measure of success has already been achieved. The Matsuhita semiconductor plant in Dallas, Texas, is now the lowest-cost producer in the group. Honda's costs in the Marysville, Ohio plant and Toyota's in Fremont, California (Joint venture with GM) compare favourably with those of their counterparts in Japan. The target for outflanking are the new industries that are replacing the smoke-stack industries. And the tool? Program research, an American discovery (General Electric, Bell Labs) just like the training and management which the Japanese took to heart. The notable successes of program research are the development of the atomic bomb and putting a man on the moon. This strategy calls for innovation, not mere imitation, as hitherto.

The 64 million \$ question: Can Japanese westernise and still remain Japanese? With Mitsubishi adopting English as its business language and C Itoh priding itself as being 'Globally Integrated' can Japan still retain its roots? Time alone will tell.

Three study groups on drug industry

Three groups to look into specific aspects of exports, production and price and quality control in the drug and pharmaceuticals industry have been set up. The groups will submit their reports to the Development Council for drugs and pharmaceuticals industry within three months. While the group on exports will be headed by the President of the Federation of Indian Export Organizations (FIEO), Mr. Ramu S. Deora, the group on production and prices will have Mr. Chandu Hatankandi as its chief. The one on quality will be chaired by the Drugs Controller, Mr. Prem Gupta.

This decision was taken at the first meeting of the newly constituted Development Council for drugs and pharmaceuticals industry held in New Delhi on February 9. The meeting was chaired by the Secretary in the Department of Chemicals and Petrochemicals, Mr. H. K. Khan. Mr. Khan said the proposed national drug authority will be set up by March. The rules to govern the functioning of this authority are now being finalised. He also said incentives would be given to export-oriented drug and pharmaceutical units.

According to Mr. Deora, the Petrochemicals and Chemicals Secretary has agreed in principle to his suggestions on the incentives sought for export-oriented drug units. These incentives are: exemption of formulations made by a drug unit from the

price control if 25 per cent of its production of a particular drug is exported and complete exemption of units from price control if 50 per cent of its turnover is exported.

Mr. Khan also agreed to consider the suggestions that the existing parameters between the value of production of bulk drugs and formulations should not be applicable to units which export 20 per cent of their formulations. Similarly, suggestions that units having 10 per cent or more of the turnover in export activities should be allowed to make one per cent additional profit and that exports be excluded while computing cost of production would also be examined sympathetically.

Mr. Khan said there is more emphasis on production of non-essential drugs. The Government is trying to encourage production of more sera and vaccines, as the number of vaccines produced in the country was not enough and imports are being resorted to for vaccines.

It was pointed out that the drug industry's research and development efforts accounted for only two per cent of its turnover compared to 10 per cent for units in advanced countries. The small units were urged to step up their research and development activities.

Mr. Khan asked the multinational and FERA drug companies to impress upon their parent companies

to facilitate transfer of modern technologies. He also suggested that there should be co-operatives created for maintaining quality control.

The Government noted that manufacturers of drugs like vitamin-A had jacked up prices as much as by 100 per cent. Mr. Khan, therefore, urged the industry to impose self-discipline on the price line. There was a divergence of views on the scrapping of loan licensing system.

He said the Government would consider the comments received from the industry on the draft notification on good manufacturing practices and loan licensing system, circulated to the manufacturers. He also informed the council that the Indian Medical Association had agreed on setting up a drug information centre.

NFL UNIT SETS NEW OUTPUT RECORD

The Bhatinda unit of the public sector National Fertilisers Ltd., set a record last month by producing 47600 tonnes of urea, 111.7 per cent of the monthly rated capacity.

With consistent improved production during the recent past, the unit has also established a new production record for the first 10 months of any corresponding period so far.

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More drugs under DPCO hinted at

Bulk drugs and formulations, which are outside price control and whose input prices have been steeply raised, may have to be brought within the purview of the Drugs Prices Control Order, 1987.

This indication was given by the Union Minister of State for Chemicals and Petrochemicals, Mr. R.K. Jaichandra Singh, at a meeting organised at N. Delhi on Feb. 5th, to review the performance of five public sector drug units.

The Minister was responding to complaints made by the managements of the drug units that some of the companies supplying raw materials to them had raised the prices, thereby pushing up the price of the bulk drugs and formulations, which were outside price control.

The public sector managements wanted such increases in price should be checked and a review undertaken to consider if these drugs should be brought under price control system. The five drug units, whose performance was reviewed, were Indian Drugs and Pharmaceuticals Ltd., (IDPL), Hindustan Antibiotics Ltd. (HAL), Bengal Immunity Ltd. (BIL), Bengal Chemicals and Pharmaceuticals Ltd., (BCPL) and Smith Stanisteeet Pharmaceuticals Ltd. (SSPL).

The management of HAL informed the Minister that it would earn a net profit during the current financial year, while that of IDPL gave the assurance that its performance will improve with the implementation of the rehabilitation plan. HAL's net profit would be Rs. 4.5 crores and its production during April-December 1987 went up to Rs. 50.25 crores against the target of Rs. 49.6 crores. The company was asked to take more interest in the manufacture of veterinary products.

HAL's overall capacity utilisation was estimated at 79 per cent against 66 per cent in the previous year.

IDPL also increased its production by 105 per cent over the target set under the rehabilitation plan. Its production of formulations, providing for more value addition, accoun-

ted for a share of 51-60 per cent in the total production.

IDPL's total production during the first nine months of 1987-88 was estimated at Rs. 109.51 crores against the target of Rs. 103.99 crores.

The three Bengal-based drug companies, BIL, BCPL and SSPL, however, continue to incur losses although they have recorded improved performances. The rehabilitation plan of these companies are under consideration of the Industrial Reconstruction Bank of India. The Minister asked the companies to adopt an aggressive marketing strategy to improve their performance, particularly in the domestic market.

A DIFFICULT TASK

Commenting Editorially *The Financial Express* says:

Addressing the annual meeting of the Indian Drug Manufacturers' Association (IDMA), the Secretary to the Department of Chemicals and Petrochemicals, Mr. H.K. Khan, stated that health for all by 2000 AD was not an "empty slogan" and that the country would reach this goal. Considering, however, the leeway to be made up it should not cause any surprise if the goal remains beyond the reach of the pharmaceutical industry. Production of formulations went up by only Rs. 150 crores a year during the four-year period ended 1986-87. The industry will have to raise production by Rs. 500 crores a year even to reach the Seventh Plan's modest target of Rs. 3,775 crores. The industry will have to accelerate the pace of production even after reaching the Seventh Plan target as production worth Rs. 1,500 crores a year will be required to enable the country to ensure health for all by the turn of this century. This calls for a massive flow of funds into the industry. Unfortunately, a climate conducive to rapid growth of the industry has not yet been created. Mr. Khan claimed that the Drugs (Prices Control) Order (DPCO), 1987 was the "high point of the measures announced by the Government for revivalling the drug industry." Although Mr. Khan stated that "implementation of DPCO is not held back

reason whatsoever." In reality, this is not the whole truth. Significantly, the outgoing President of IDMA, Mr. I.A. Modi, urged the Government that "for immediate implementation of DPCO the notification regarding the professional service charge and revised trade margins should be issued without further delay." The Government has also to revise conversion norms and packaging charges. In the circumstances, it is difficult to agree with Mr. Khan when he said that DPCO has already become operational."

As was only to be expected, Mr. Khan referred to the Government's bid to help the industry by reducing the span of control and raising the mark-up for essential drugs. There is, of course, no denying that "the control basket has been reduced from 347 to 166 drugs." It must be added, however, that price control still covers about 75 per cent of the industry's sales turnover against 80 per cent earlier. As regards the maximum allowable post-manufacturing expenses (MAPE) for essential drugs, the prescribed rate of 75 per cent is "a bare break-even." The incoming President of IDMA, Mr. Vinobhai U. Shah, suggested that it should be raised to 90 per cent to encourage the industry to step up production of essential drugs included in Category 1. The industry can, however, draw comfort from the fact that Mr. Khan is inclined to support the industry's demand for rationalisation of the customs duty structure and has set up a "reviewing authority" to look into complaints regarding price fixation. The customs duty on bulk drugs should be higher than that on intermediates so that domestic producers would be encouraged to produce bulk drugs by importing intermediates. It is good that Mr. Khan has endorsed this view. Care must, however, be taken to ensure that domestic producers of intermediates are not hurt in the process. Even more significant is Mr. Khan's announcement regarding the "reviewing authority." As the Supreme Court has ruled that price fixation under DPCO is a legislative function, producers have no alternative to accepting prices fixed by the Government. As the Government has decided to set up reviewing authority independent of that which fixes prices producers

US firm seeks ISRO knowhow on polyol

Polyurethane Products, a U.S. based company, has sought technology from the Indian Space Research Organisation for the setting up of a castor oil based polyol manufacturing plant in the country. Polyols, a basic ingredient of polyurethane and used in a wide range of other products, are at present being manufactured by the Kerala State Industrial Development Corporation.

Mr. P. Sudarsan, director, technology transfer and industry co-operation, told members of the forum of financial correspondents (FOFIC) in Bangalore on January 30th that no decision had been taken by the ISRO yet whether to sell the technology to the American company or not.

The process for making polyols, developed by ISRO scientists, is unique in that it uses castor oil as the raw material while in other technologies, petrochemicals are used.

Mr. Sudarsan said that several such technologies developed by the ISRO were now being sought by companies abroad which was an indication of the high standards of indigenous capabilities in this field.

According to him a corporate front was being set up at the ISRO to facilitate the transfer and promotion of know-how from the ISRO labs to the industry as well as to harness technologies of use to the space programme.

He said that in the past ten years the ISRO had transferred over 130 different technologies while over a 100 were in the pipe line. The response from the Indian industry, he said, had been very good and on an average nearly 100 companies applied for each technology being transferred from the ISRO. An elaborate system of technology transfer had been set up to ensure proper selection of industries which were capable of taking up manufacture, he said.

Mr. Sudarsan felt that there was a vast potential in the country for the utilisation of space related technologies because of the market created for remote sensing and communication equipment by the space programme. At present almost all the remote sensing equipment were being made indigenously and in the past three months the products had been exported to six countries abroad. With the launching of the INSAT 1 C the market for business communication systems would go up

Mr. Sudarsan said that the ISRO sought to create a net work of industries capable of manufacturing sophisticated space equipment for the ISRO indigenously leaving the organisation free to carry out research and developmental activities to fulfil the goals of the Indian space programme. The industry, he felt, should adopt a consortia approach and take up turnkey projects to supply products to the ISRO.

PHOSPHATE AS PLANT NUTRIENT RECOMMENDED

Intensive application of natural rock phosphate as a plant nutrient may be the answer to augment food grain production in the country hampered by low usage of expensive artificial fertilisers.

There are 130 million tonnes of known reserves of rock phosphate in the country which could be used as a cheap alternative to chemically processed water soluble phosphatic fertilisers, according to a paper presented at a recent symposium on "Use of rock phosphate" held in Bangalore.

Only 2.2 per cent of arable land in the country was high in phosphorus use and there was an immediate need for increased phosphorus application for achieving high productivity.

The paper said even some of the high agricultural crop producing countries like UK, USA, USSR, Brazil and West Germany were engaged in mining rock phosphate to supplement chemical fertilisers.

The paper said for maximising yield, plants need all three types of nutrients like phosphorus, nitrogen and potash. Many plants have the capability to fix atmospheric nitrogen but phosphorus has only to be applied as fertiliser.

Deficiency in any one of the nutrients leads to unsatisfactory crop production and in some cases it had been observed that lower than required use of phosphorus has been found to adversely affect even the response to nitrogen.

The paper added that the Indian Council for Agricultural Research (ICAR), had recognised the Mussoorie rock phosphate and Purulla rock phosphate for direct application, both abundantly available in the country.

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Tie-up likely to build 'supercollider'

Prof. M. G. K. Menon, Scientific Adviser to the Prime Minister, recently indicated that India was exploring possibilities of having a tie-up with Fermilab-Chicago, in building the \$4.4 billion "superconducting supercollider", the world's most expensive "atom smasher".

Talking to reporters in Bombay at the inauguration of the world conference on "quark gluon plasma", described as an exotic state-of-matter, Prof. Menon said Indian technology and expertise in the fields of radio astronomy, astrophysics, nuclear physics, elementary particle physics and cosmic rays made it possible for the country to contemplate such an international joint venture.

The Indian involvement will be in the form of utilisation of its scientific talent and manpower thereby reducing the cost component of the machine which was expected to mimic the nascent scenario of the "Big Bang" that is believed to have created the universe.

Significantly, the Director of Fermilab, Prof. Leon Ledermann, is in India. He will be attending the conference at which, important findings on this exotic state of matter will be presented by experts notably from the Geneva-based European Nuclear Research Centre (CERN) laboratories.

Inhibiting factors

Prof. Menon said Indian scientists were also involved in the CERN experiments but a greater involvement with CERN laboratories involved becoming a funding partner, along with some other developing nations. This had been among the inhibiting factors that had prompted Britain to consider withdrawing from its experiments, he said.

India, he said, could not afford to pay such astronomical costs for enrichment of its scientific capabilities due to its scarce resources. The Asian countries also possibly could not finance such a gigantic project, he said in reply to a question.

The supercollider is a tool bringing together physicists and cosmologists who are probing the fundamental particle in the universe in order to explain its origin and composition. The proposed super collider is 40 times more powerful than existing accelerators.

In the existing one trillion EV accelerator which has a circumference of six km. each particle circles the machine at least 50,000 times a second, gaining energy during each revolution through superconducting magnets.

It will be used to bombard particles at high energy to deconfine quarks which are glued together by a mysterious force called gluons. While scientists could identify the presence of quarks, none had succeeded in containing the quark in plasma.

Dr. Bikash Sinha of Calcutta's Variable Cyclotron Centre, convenor of the five-day conference being hosted at the Tata Institute of Fundamental Research, said delegates

from 14 countries, including the United States, Soviet Union, China, Pakistan, Brazil, Japan and Europe were attending the conference.

Addressing the distinguished gathering, Dr. Sinha said quarks and gluons were perhaps fundamental building blocks of everything not only on earth but throughout the cosmos. It was further believed to be the state of the universe just micro-seconds after its creation.

He said the collision of two nuclei at CERN was actually mimicking that primordial epoch of creation. India already had three accelerators in Calcutta, Bombay and Delhi. He described these centres as springboards for reaching out to truly frontier areas of research and its associated spin-off in extremely advanced technology in India.

World physicists meet

Some of the leading physicists from over a dozen countries converged at Bombay on February 5th to discuss the latest in their quest for the most fundamental particle in nature.

The community of particle physicists is also anxious to know if anyone had succeeded in mimicking the condition of the universe just a micro-second after its creation.

At the ensuing international conference at the Tata Institute of Fundamental Research in Bombay the European Nuclear Research Centre at Geneva for the first time, announced the results of such an experiment conducted in September 1987.

The international conference on the physics and astrophysics of Quark-Gluon Plasma was from February 8 to 12.

Quarks are believed to be the fundamental particles of matter and their presence have been proved by various laboratories. The conventional theory that proton, neutron and electron are the fundamental particles is no more valid.

The quarks and their binding force, Gluon, exist only under very special circumstances as must have existed when the universe was only a micro-second-old. Such a condi-

tion does not exist in this world as it is impossible to create such high temperatures or densities which followed the birth of the universe.

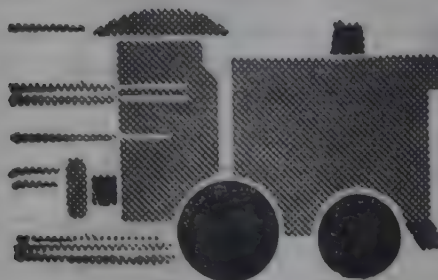
However, development in the field of accelerators had helped in creating an appropriate environment in a laboratory by colliding with two heavy nuclei at extremely high energies, Prof. B. V. Sreekantan, chairman of the organising committee said.

While scientists could identify the presence of quarks and their counterparts called leptons, no one has yet succeeded in containing the Quark in plasma. If the CERN experiment achieved it, many theories which had no proof, hitherto, will become true.

For example, the physicists who looked into the microcosm of a particle and the cosmologists, who studied the birth of the universe, would come to the conclusion that all the fundamental forces of nature, namely gravitation, electromagnetism, weak and strong and the fundamental particles like Quarks and leptons had a common origin.

Recently, serious scientists have even taken up a study of what happened before the birth of the universe and this field does not lie in the realm of theology anymore.

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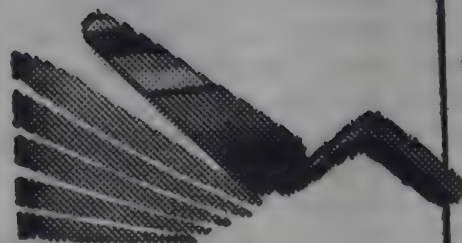


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ABID HUSSAIN REPORT REJECTED

4-Tier structure for CSIR

The CSIR society of India, the apex scientific body under the chairmanship of Prime Minister, Rajiv Gandhi, has approved the four-tier structure for the Council for Scientific and Industrial Research.

The society categorically rejected the Abid Hussain committee's recommendation that the laboratories should be taken out of the purview of CSIR and transferred to their user ministries.

The society recently considered the draft prepared by CSIR on the Abid Hussain committee's report incorporating the comments made by Scientific Advisory Committee to the Cabinet (SACC). Authoritative sources point out that almost all the suggestions contained in the improvised document were accepted with minor modifications.

The society agreed that the CSIR laboratories should meet 33 per cent of their research costs through internal resources. The Prime Minister had earlier suggested internal resource generation to the extent of 40 per cent, the society felt that it would be rather steep and hamper R and D in the frontier areas where private participation was non-existent.

The Abid Hussain committee had stressed the need for internal resource generation. Currently CSIR laboratories generate resources to the extent of 22 per cent. The Prime Minister told CSIR that the recommendations approved recently should be implemented within the next three months.

The society approved that the CSIR should have a four-tier structure with the research council at the top, with five technology advisory councils coming next. The third stage would be that of the governing body and the CSIR. The society approved that representatives from the user departments should be included in all these councils along with the industry representatives.

The idea of including the user ministry representatives was that the R and D should be directed in the specific areas as suggested by the users according to their needs.

Commenting on structural changes, the Prime Minister suggested that CSIR should also evolve a strategy to involve the industry in a big

way. Currently CSIR interacts with the major organisations such as Ficci, Assocham, CEI etc. providing consultancy services. This does not take R and D far. The strategy, according to Mr. Gandhi, should be such that CSIR and the individual industry should come together from time to time, evaluate R and D conducted in certain areas and set up pilot projects if the industry so desires with financial assistance from CSIR. This would hasten the process of technology transfer.

Attempts should also be made to ensure that the industry should have the requisite capacity to imbibe the imported technology and improve upon it. The Prime Minister urged that interaction with the industry should be motivated by 1) absorption of imported technology and 2) in frontier areas of R and D CSIR and the industry should pool their resources and capabilities to remove the reliance on imported technology. The goal should be to achieve self sufficiency in technology in frontier areas through advance forecasting and requisite measures taken to achieve it.

The society also discussed the need for greater incentives to CSIR for encouraging innovations in the specified fields. A high-level group was announced to recommend the incentives to be given to the council towards this end.

As to the winding up of 100-odd research centres, the society suggested their working should be wound up. However some of these should be turned into extension centres for creating awareness of scientific achievements at grass root levels. The Abid Hussain committee had recommended that these centres should be wound up.

The Abid Hussain committee had severely criticised the working of CSIR and suggested that their R and D laboratories should be transferred to the user departments. It had also suggested that the laboratories should be operating like commercial organisations and generate internal resources to the tune of 33 per cent. The committee had called for curtailing the powers enjoyed by the director-general, CSIR and infusing new blood into the scientific organisations, this had

enraged the scientific community. The matter was referred to SAC which in fact endorsed the view expressed by CSIR and agreed that there was no need to transfer the labs to the user departments. SAC had stated that the experiment of transferring the labs to the user departments during Janata regime had proved a disaster and it should not be repeated again. It had suggested structural changes which were endorsed by CSIR later and finally adopted by the society.

RESTRUCTURING OF CSIR, LABS NEARING COMPLETION

The restructuring of the Council of Scientific and Industrial Research (CSIR) and its laboratories will be completed in the next three months and impact of the change proposed would begin to be felt after this period.

This was stated at New Delhi on February 8, by Dr. A.P. Mitra, Director General of CSIR, while addressing a news conference.

A Technology Advisory Board headed by an eminent scientist would soon be constituted to advise CSIR headquarters on various technology development schemes.

Similarly, Research Councils of Laboratories would be reconstituted. The scientists at the bench-level would now have far more autonomy in pursuing research and procuring equipment and materials.

Dr. Mitra said CSIR would now formulate a three-year budget for laboratories (instead of annual budgets) with sufficient flexibility to adjust spending within the allocation. The decentralisation of administrative and financial powers would help laboratories cut down red tape and expedite projects within time targets. The simplified procedures for purchase of equipment and materials locally and through imports would enable laboratories take decisions across the table, Dr. Mitra said.

Dr. Mitra said the administration would no longer be hierarchy-oriented. Though laboratories would enjoy considerable autonomy hereafter, CSIR Director General would continue to monitor projects and expenditure.

Recruitment and promotion procedures of CSIR would be streamlined. The number of administrative staff vis-a-vis scientific staff would be brought down.

CECRI makes a breakthrough in radiation-resistant system

While developing a build-coating system for nuclear power stations and marine structures the Central Electrochemical Institute (CECRI) in Karaikudi has achieved a major breakthrough in the field of radiation resistant protective coating systems.

Addressing presspersons the institute Director, Prof. K.I. Vasu said the most important properties required of the paint coatings used by nuclear establishments were resistance to irradiation, low contamination by contact with radio nucleides, good decontaminability, low activity and good corrosion protection. The BARC has been importing these paints because of the difficulties faced in getting the material due to delay in shipment and quality control besides high cost.

The Power Plant Engineering Division of BARC, Bombay, felt the need for the development of an Indian substitute for the system and approached the CECRI for developing it.

Three-coat system paint:

Undertaking the work on sponsorship basis the CECRI has come up with a high-build three coat system paint comprising zinc sodium silicate primer or zinc ethyl silicate as primer, epoxy-based paint (under coat) and epoxy-based titanium dioxide (finishing paint). The paints have passed the BARC tests as stipulated by the Atomic Energy Commission.

Prof. Vasu said the CECRI had developed the know-how for the paints based on indigenous raw materials. The foreign exchange savings envisaged amounts to Rs. 3 crores a year.

Other uses:

The coating system developed by the CECRI was essentially for nuclear power plants. Its use is not exclusive as a radiation resistant coating. It is reportedly useful as a high building paint for marine structures.

Prof. Vasu said this zinc-rich paint gave cathodic protection to the metallic structures for several years

against aggressive marine corrosion and tests conducted at the CECRI, Mandapam found its performance good. The scientists responsible for this development were Dr. S. Guruswamy and Messrs. M. Sundaram, V. Chandrasekaran, P. Jayakrishnan, K. Raghupathy and V. Ganesa Sarma. The National Research Development Corporation of India, New Delhi, has presented an award to the CECRI.

It has been suggested that the capital outlay for a plant capable of producing 100 tonnes of this high-build paints will be Rs. 30 lakhs.

Prof. Vasu told pressmen that it was proposed to convert the Mandapam unit into a testing and research centre. The Madras unit of the CECRI was developing an anti-corrosive system for automobile. The institute in Karaikudi was also developing a paint using water as primer.

Prof. Vasu also spoke of a system under study by which automobiles for instance could be "electro-painted". Under this system automobiles need not be painted with brush or spray. Instead the job will be done by electrodes.

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'Small power units have major scope'

With more than a lakh villages in the country still to be electrified the prospects for decentralised small power units based on solar wind and biomass are tremendous, Dr. Gururaja, Adviser, Department of Non-Conventional Energy Sources, Government of India said.

Inaugurating a four-day international symposium on "Batteries and fuel cells" organised by the Central Electro-Chemical Research Institute in Karaikudi, on Feb. 3 he said he was confident that developments in solar photovoltaics, particularly in the area of thin film tech., would result in a breakthrough. Then the demand for small power units in which batteries played a crucial role would be great.

Mr. Gururaja felt that while the conventional batteries were being used there was need to focus attention on research and development directed towards meeting specific requirements of new applications. For photovoltaic system the requirements were high-charging efficiency, low

self-discharge and high cycle life. He said the so-called maintenance-free batteries introduced in the country recently have not so far achieved unqualified success. There was still scope for considerable improvement of maintenance-free batteries.

Mr. Gururaja said that though the Indian battery industry had a fairly long history, only in recent years the industry had begun to realise the enormous gap that existed between what was available in the country in terms of technologies and products and those in industrialised countries. Advances in materials, techniques and applications had extended the performance by batteries beyond what seemed unattainable a few years ago.

Projects:

He said fuel cell research was confined to a few institutions — CECRI, BHEL, TERI and IIT. Projects sponsored by the Department of Non-Conventional Energy Sources included development of an experimental fuel cell for electrode kinetic

studies and performance evaluation on-site integrated energy systems, fuel cell coupling with biogas plant development of a 5 kV phosphoric acid fuel cell power pack and studies on biochemical fuel cells.

During the Seventh Plan period Mr. Gururaja said, efforts were made to strengthen research and development. The approach was multi-institutional. Three thrust areas have been identified, namely chemical routes for trapping solar energy, electro-chemical batteries and fuel cells and hydrogen. National-level research programmes had been evolved which were expected to build basic capabilities in these areas.

This is the first international symposium to be hosted by the CECRI and it is being attended by 16 overseas scientists and 110 Indian scientists.

Presiding over the inaugural function, Prof. K.I. Vasu, CECRI Director, said that the CECRI was a premier centre for electro-chemical research in India and the largest centre in the world devoted to all aspects of electro-chemical science and technology.

It had pioneered a big thrust in battery research and development with a total investment of Rs. 100 crores. With 60 scientists and technical staff working in different areas of batteries and fuel cells — both for the improvement of the conventional ones and for the development of modern exotic battery systems such as the conducting polymer batteries.

Dr. Mathur, head of the Division of Batteries and Fuel Cells (CECRI) welcomed the delegates. Mr. P.V. Vasudeva Rao, scientist, introduced the overseas delegates and Dr. Ved Mitra, Department of Non-Conventional Energy Sources and Mr. Deshmukh of Standard Batteries Ltd. spoke.

Dr. R.M. Dell of the Atomic Energy Authority, U.K. released the proceedings of the national conference on power sources. Dr. Rahner, University of Technology, Dresden, released the Handbook of Electro-chemistry and Dr. K. Swaminathan released a battery directory. Dr. N. Venkatakrishnan, scientist, thanked

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LDPE imports : IPCL to stop subsidy

While the Indian Petrochemicals Corporation Limited (IPCL) is to continue importing adequate quantities of LDPE through the State Trading Corporation (STC) to meet growing domestic demand, it has decided to discontinue the practice of subsidising the cost of imported raw materials from the coming financial year and is presently engaged in working out a new pricing policy for the product.

Disclosing this to newsmen Mr S Shah, IPCL marketing director, said that during 1987-88 the corporation imported around 43,000 tonnes of LDPE at an average cost of Rs 35,000 per tonne. IPCL's own production of the commodity was in the region of 30,000 tonnes at a cost of Rs 25,000 per tonne. After pooling of prices, the selling price of the material was fixed at Rs 27,000 per tonne and in the bargain IPCL was saddled with a heavy subsidy burden.

As per the projections for 1988-89, around 100,000 tonnes of LDPE would have to be imported and with product's limited availability in the international market, prices could be even higher than in the previous year. As IPCL has decided not to subsidise imports any longer, the pool price for the commodity could register a significant increase.

Mr. Shah, however, said that IPCL was in favour of a steady price for the entire year in order to discourage speculative activities. The new pricing formula is likely to allow for a price higher than the pool price to start with so as to cushion the effects of any international price increases in the latter part of the year.

IPCL is, for the first time in the country, setting up a pilot project for the manufacture of carbon fibre, a high-tech product with diverse applications in areas such as aviation and sports. The technology for this product has been obtained from R.K. Engineering of UK and the pilot plant, which is expected to go into production by 1990, would have a capacity of 12 tonnes per annum. At present the total domestic demand for this product is in the region of only 2 tonnes and

IPCL is taking up a project to popularise its use in the country.

Mr Shah said that IPCL was introducing, in the first quarter of 1988, four new products also for the first time in the country, these being polypropylene co-polymer, dry-spun acrylic fibre, engineering plastics, and wire and cable compounds. While the corporation had already set up two new plants for 25,000 tonnes per annum of polypropylene co-polymer in collaboration with Montedison of Italy and a 12,000 tonnes per annum dry-spun acrylic fibre in collaboration with Du Pont, USA it has entered into an agreement with General Electric Plastics (GEP) of USA for import of polycarbonate and PPO for engineering plastics applications and with British Petroleum for import of LDPE wire and cable grade compounds for telecom and power cables.

In the area of engineering plastics and cable compounds, IPCL will be the sole selling agency to import these products for market seeding. As and

when sufficient domestic demand develops, manufacturing facilities would be set up, he said. With regard to engineering plastics, Mr Shah said that the MoU reached with GEP also provided for setting up of compounding facilities prior to full-scale production of polycarbonate and PPO resins. IPCL would also set up a Rs 6 crore product application centre, he added.

IPCL's future diversifications, he said, would be based around the corporation's primary objective of creating a demand for useful products.

IGC, IPCL MITE FOR DROUGHT RELIEF

Hindustan Organic Chemicals Ltd. and Indian Petrochemicals Corporation Ltd., two public sector undertakings are contributing Rs. 50 lakhs for drought relief work in Ahmednagar district.

A cheque for Rs. 15 lakhs, the first instalment, was handed over to Mr. Rajendra Singh, Commissioner, Nasik division, recently. This will be used to provide permanent water supply in Parner taluka.



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Rs. 1 cr. central grant for research on silicon technology

In acknowledgement of the significant contribution made by Metkem Silicon Ltd. at Mettur to silicon technology, the Government of India through the Department of Non-conventional Energy Sources has sanctioned a grant of Rs. 1 crore to the unit for carrying out research and development programmes.

The work to be undertaken will be in three broad areas, primarily aimed at the reduction of input chemicals and energy in the manufacture of polysilicon and in the production of extremely high grade material. The scope also includes unique approaches to silicon production technology. The department will also give a soft loan of Rs. 50 lakhs for this research project allotted for the first time by the Department to private sector.

Announcing this while replying to felicitations offered to him on the conferment of Padmashri by the staff and workers of Metkem Silicon Ltd., recently at Mettur, Mr. R. V. Ramani, Director of the unit, pointed out that this

acknowledgement by the Government of India was the cumulation of nearly two decades of relentless toil by the scientists of Indian Institute of Science, Bangalore and the workers of Metkem Silicon.

Tracing the development of this unit thanks to initiative of two scientists, Dr. G. Suryan and Dr. A. R. Vasudevamurthy from the Indian Institute of Science, Mr. Ramani said the work of the unit was kept in dark for sometime due to various factors including the dearth of finance. The advisers of the Department of Non-Conventional Energy Sources extended adequate support that encouraged those involved in the hi-tech research to complete the project.

However he pointed out silicon chemistry in the country was in elementary stage and it required infrastructural support and adequate financial assistance for further development. He thanked the Mettur Chemical Industry, the parent company for providing financial help to undertake the project.

Dr. J. Gururaja, Adviser, Department of Non-Conventional Energy Sources, presiding said the department was proud of this achievement and it was in the fitness of things that Padmashri was conferred on Mr. Ramani for science and technology and for the exceptional team work he had guided.

Of international standard

The work was carried out against several odds and in diverse conditions and silicon manufactured in this unit had been found to be of international standard in tests conducted by the department in France and other countries. Already the unit had begun supplying silicon wafers to photo voltaic industries in the country and he hoped that the day was not far off, when self-sufficiency would have been achieved.

The Government of India in recognition of this notable achievement, had decided to offer further encouragement in the form of direct and market support and financial assistance for carrying out Research and Design programmes. Dr. Gururaja said the thrust was now on harnessing the non-conventional energy sources to the extent possible.

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Raw materials bank for plastic units soon

A committee to monitor the supply and prices of indigenous raw materials and the setting up of a raw material bank for the plastic industry, are among the major announcements made by Mr H.K. Khan, secretary, department of chemicals and petrochemicals.

The bulk purchase of raw materials like poly vinyl chloride (PVC) and high density polyethylene (HDPE) from foreign markets through the State Trading Corporation are also being worked out, Mr. Khan said. Mr. Khan was speaking at a workshop on plastic resins — scarcity and rising prices conducted by the National Alliance of Young Entrepreneurs (NAYE), Maharashtra chapter. The monitoring committee which is being set up this month, will review the prices and supply position of raw materials at an interval of every 15 days.

With the indigenous suppliers unable to meet the raw material demands of plastic units, bulk imports will help to ease the present situation, Mr. Khan said. The raw material bank will help in the uninterrupted supply of raw

materials to the processing units, according to Mr. Khan. The bank will stock a mixture of indigenous and imported raw materials and a pool price will be maintained, he added.

HOPE FOR PLASTICS

Addressing a workshop on "Plastics resins: scarcity and rising prices" organised by the National Alliance of Young Entrepreneurs in Bombay, the Secretary to the Department of Chemicals and Petrochemicals, Mr. H. K. Khan, raised the hope that the Government would help the plastics industry overcome the crisis created by the recurring shortage of its basic raw materials and their rising prices. Indigenous production of basic raw materials such as low-density polyethylene, high-density polyethylene, polypropylene, polystyrene and polyvinyl chloride is wholly inadequate to meet the industry's growing demand. There is, of course, no denying that the Government has placed imports under open general licence. But this facility is of little avail as importers have to carry

a heavy burden of the customs duty. Moreover, international prices of the materials have doubled during the past one year. The President of the Organisation of Plastics Processors of India, Mr. M. P. Taparia, has attributed the rapid increase in international price to "a bottleneck in the capacity of ethylene, the basic feedstock, which will continue through 1988 and part 1989." If past experience is anything to go by, the industry's fear that domestic producers of raw materials would exploit the situation in the international market to their advantage cannot be said to be unfounded. Certain measures outlined by Mr. Khan will undoubtedly go a long way to enable the industry maintain a steady rate of growth. Significantly, Mr. Khan indicated that this Ministry was inclined to support the industry's demand for customs duty reliefs. This has assumed importance not only because imported materials have become prohibitively costly but also because the rupee is losing strength vis-a-vis major foreign currencies. The industry can draw comfort from the fact that Mr. Khan is in favour of monitoring the impact of duties on a continuous basis. Mr. Khan also indicated that the Government would keep a close watch on the trend in prices and supply of indigenous raw materials. This, coupled with the Government's plan to create a raw materials bank, should enable the industry to procure raw materials on a continuous basis and at reasonable prices.

Considering that the Government is keen to help the industry in respect of both supply of raw materials and their prices, it is not surprising that the Industrial Development Bank of India (IDBI) has promised to redress the industry's grievance about the refinancing scheme. IDBI had suspended this scheme primarily because the raw materials crisis had threatened the very existence of several units. Now that the Government is contemplating "a relief package" to the industry, it is not surprising that IDBI has agreed to reintroduce the refinancing scheme in the wake of the intervention of the Department of Chemicals and Petrochemicals. While the Government must expeditiously introduce all measures promised by Mr. Khan the industry ought to respond positively by intensifying its efforts for cost control and export promotion.

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Acrylic fibre project with Japanese tie-up being promoted

A consortium of three Japanese firms led by Marubeni Corporation will provide technical know-how for the proposed Rs. 90-crore acrylic fibre project of Consolidated Fibres and Chemicals Ltd., being promoted jointly by the P. Goenka group and West Bengal Industrial Development Corporation (WBIDC) in Haldia.

An agreement was signed in Calcutta recently between Mr. Goenka and representatives of the three firms, namely Mr. T. Fujiki, general manager, Marubeni Corporation, Mr. S. Isaka, managing director, Japan Exlan Company Limited and Mr. T. Matsumoto, general manager, Kawasaki Heavy Industries Limited.

Japan Exlan Company will supply the technology and Kawasaki Heavy Industries some equipment. Marubeni Corporation will act as the co-ordinator.

"We are happy to be associated with the Japanese firms whom we have selected on both cost and quality consideration after carefully examining offers from other countries and visiting the plants," Mr. Goenka observed.

The work on the project is expected to start within six months and commercial production by 1991. About 25 acres of land has been acquired from WBIDC at Haldia.

The plant's annual capacity is 12,000 tonnes. The breakeven point would be reached at 60 per cent capacity utilisation. The company is also confident of the supply of raw materials like acrylonitrile, imports of which has been placed under OGL and methyl acrylate which is available indigenously. It may be recalled the acrylonitrile which was originally included in the product-mix was subsequently dropped.

Two major producers of acrylic fibre in India are IPCL and the JK group and together they have a total capacity of 48,000 tonnes.

The plants of these two companies operate at 90 per cent capacity. The

country now imports about 10,000-12,000 tonnes of acrylic fibre annually. By 1991 the demand is estimated to go up to 100,000-110,000 tonnes.

IPCL's ADVANCED COMPUTER SYSTEM

Mr B. G. Deshmukh, cabinet secretary, Govt. of India, during his visit to IPCL, inaugurated the most advanced computer system for monitoring ambient air quality built at a cost of over Rs 1.5 crores recently. Dr S. Ganguly, chairman and managing director of IPCL, explained to him the working of the system.

IPCL has installed four fixed monitoring stations at different locations in the complex. The half hourly data from these stations are fed to the computer. There is an alarm device which alerts the operation control group's personnel

for immediate corrective action if the value of one of the pollutant goes beyond the specified limit. Apart from these four fixed monitoring stations, a mobile van containing air monitoring system has also been procured for on the spot measurement in any specific area outside the complex.

Alongwith air pollution monitoring system, an advanced risk management system, was also inaugurated by the cabinet secretary. This system involves identification of probable hazardous events, their classification and feeding to the computer system. In any eventuality, the computer is capable of displaying and printing the hazard-ranges depending on the wind direction, direction, velocity and TLVs (threshold limit values) of the chemicals.

The operation control group of IPCL is also equipped with an on-line terminal connected to main ND-500 A and B computer system. The data in respect of daily and monthly production, receipts, despatch, stock raw material consumption, product transfer, down time analysis etc. are generated with the help of this terminal.

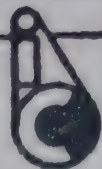


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Subsidy suggested for coal industry

In the event of the administered pricing formula failing to cover the costs of production and ensure fair return on the investments made over the years by the coal industry, the Government should consider various compensatory measures such as subsidy to producers, according to the Joint Bipartite Committee on Coal Industry's sub-committee on investment and costs.

The committee comprising Chairman and Managing Director of Eastern Coalfields, Director (Personnel) of Central Coalfields, chief finance manager of Coal India and three central trade union leaders one each from CITU, AITUC and INTUC, accepts that under the present pooled pricing system it is possible that certain projects make losses and others earn adequate profits so that on the whole the net return is commensurate with the level of investment.

The committee, however, feels that if for some reason the administered prices do not provide for normative costs plus adequate return on invest-

ments, this aspect should need consideration. "One method to take this factor into account could be to allow a subsidy to the extent of gap between normative cost plus return and the administered price," the committee remarks in a report.

According to the report, in many of the existing mines project reports are not available. As a result the extent of investment could not be correctly ascertained. For such mines the committee suggests that five-year plans should be formulated which should indicate the existing capacity of the mines, the phased annual investment required separately for replacements and maintenance of production and also welfare and other facilities. The plan should also indicate the five-year production target based on the investment projections.

Such an exercise, the committee feels, would facilitate preparation of alternative district and sections of mines which are likely to get exhausted in future. Besides, such a plan should

enable: (1) systematic assessment and appraisal of investment needs, (2) regulation of investment according to definite course set in the plan and monitoring the results of the investments in relation to the plan. The systems suggested pre-supposed maintenance of adequate asset records each mine.

According to the working results Coal India for the last 12 years, cost per tonne of net saleable coal has gone up from Rs. 58.82 in 1974-75 to Rs. 214.20 in 1985-86. The sale value of raw coal including the administered prices although increased from Rs. 48.84 to Rs. 191.10 per tonne could not neutralise the cost of production not to speak of any profit and return on investment.

Though some of the subsidiaries have earned profit but looking from CIL's profitability point of view as a whole, the latter is still incurring losses despite a number of administered price hikes. Possibly in the light of this the committee has suggested of compensatory measures like subsidy.

Another interesting thing emerging from the committee's report is that projects taken up for reorganisation/reconstruction of underground mines in Eastern Coalfields and Bha Coking Coal Ltd. are far from meeting the objectives set in the project report.

Although most of these projects were originally sanctioned between 1975-76 and 1979-80, 14 underground reorganisational projects of ECL which were planned to produce 11.4 million tonnes of coal in 1985-86 as per original project report, have only produced four million tonnes in that year.

In BCCL the picture is equally dismal; five underground reorganisational projects produced 1.4 lakh tonnes in 1985-86 against the project report estimate of 3.3 million tonnes.

EXPORTS MOVE UP

India's exports for the eight months starting April, 1987 registered a 20 per cent increase over the previous year's figures. Exports during the period touched Rs. 9,961 crores as compared to Rs. 7,996 crores in 1986.

According to the latest provisioned trade statistics available from the Directorate General of Commercial Intelligence and Statistics (DGCIIS), imports during the same period amounted to Rs. 14,200 crores which is 13.9 per cent higher as compared to Rs. 12,466.49 crores during the co-

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Optimal energy mix

A decade and a half after the first crisis, the world is still uncertain about the outlook for energy, except perhaps for the short run. The Indian situation is equally uncertain, despite an increase in domestic production of oil and natural gas. In view of this uncertainty, ONGC has rightly taken a study on the future energy options for India. The per capita primary energy consumption is at a low level in India — about 200 kg oil equivalent against 7,500 kg in the US, 5,000 kg in the Soviet Union, 4,400 kg in West Germany, 3,500 kg in the UK and 1,000 kg in Japan. As the pace of development gains momentum, the demand for energy in India is bound to go up at a rapid rate. For India, the options are limited. According to the ONGC study, the energy mix for 2000 AD in India would show a steady increase in the share of conventional energy (from 61 to 67 per cent during the period from 1981 to 2000) accompanied by a decline in non-conventional energy (from 40 to 33 per cent). Within the limitations set by technology, the scope for dependence on non-conventional energy is indeed limited. Therefore, there is no alternative to an increasing dependence on conventional energy sources — oil, natural gas, coal and electricity.

The ONGC study has rightly come to the conclusion that the objective of optimal energy mix will have to be governed by the need to move away from the dependence on oil. It makes a valid point in this connection that one of tomorrow's significant sources of energy is "conservation energy" which is generated through the efficient use of energy and through "the next best alternative" use. There is, it is said, scope for reducing energy consumption by 30 to 40 per cent in the developing countries through conservation methods alone. This is no exaggeration. The industrially developed countries, according to the Worldwatch Institute (Washington), have displaced, through energy conservation and efficiency, oil, gas, coal and nuclear power worth \$250 billion annually since the first oil crisis of 1973. India should take a leaf out of the book of experience of these countries.

At present, 56 per cent of oil resources in India are consumed in the

transport sector and 29 per cent in the domestic sector. Natural gas is expected to help the movement away from oil with its potential use as a transport fuel in the form of compressed gas. Rail and road transport network will have to experiment with fuel efficient operations. The oil intensity in this sector can also be reduced through mass transit systems in urban centres, railway electrification and efficient freight operations. Substitution of kerosene by natural gas and electricity in the domestic sector can also contribute substantially to this process. But the progress of conservation of oil through reduced consumption in India has so far been negligible despite efforts made by the Petroleum Consumption Research Association. Will the ONGC study provide a new impetus to the work of the Association?

— Financial Express

SUNLIGHT CAN BE USED TO KILL BUGS

Scientists announced recently what they called a major breakthrough in the

battle against bugs — an insecticide that turns sunlight into a death ray.

The insecticide, developed by researchers at the University of Illinois, employs a simple amino acid that its designers hope will be harmless to man and animals and biodegradable as well. Its potential targets range from houseflies and cockroaches to agricultural pests.

Years of spraying toxic pesticides on gardens and farms is feared to have contaminated groundwater supplies in thousands of communities around the world and may have increased the incidence of cancer and other diseases.

The discovery announced by the Illinois scientists employs an amino acid — delta-aminoisovalulinic acid — that triggers a buildup of biochemicals, naturally occurring chemicals, in the cells of the insects.

When exposed to sunlight, the overbalance of biochemicals begins a chain reaction that destroys insect cell membranes, causing the bug to suffer convulsions and die within seconds.

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Unrealistic ST policy : Gujarat rubber units hit

The rubber goods industry in Gujarat is in the doldrums because of the unimaginative sales tax policy of the state government. According to Gujarat Rubber Manufacturers' Association (GRMA) sources, at least 50 per cent of the 270-odd units, mostly in the small-scale and tiny sectors, are either sick or on the verge of sickness.

The sales tax on rubber products which is 14 per cent in the state has acted as a damper on the units and they have been unable to compete with similar units from Maharashtra, which accounts for 80 per cent of the rubber goods manufactured in the western region.

The sales tax on rubber goods in Maharashtra works to almost half of that in Gujarat at eight per cent. Moreover, goods from Maharashtra which enter Gujarat attract only ten per cent central sales tax, putting local units at a disadvantage.

The price quoted by the local units to the state's largest consumer, the Gujarat State Road Transport Corpora-

tion, has also proved to be uncompetitive vis-a-vis Maharashtra units because the corporation fixes the purchase prices inclusive of tax.

What compounds the problem for the manufacturers is that the raw materials consumed by them like carbon black, chemicals and processing oils also attract higher taxation in Gujarat. The units are unable to pass on this added burden, to their customers because of the lower rates quoted by their neighbouring competitors in lieu of the tax advantage.

In the last budget, the Gujarat government introduced sales tax on recoating of old and used rubber rolls and refining of tanks, vessels and pipes. According to GRMA, the process involved is re-rubberising of worn-out rolls which is not a production process at all and, therefore out of the ambit of sales tax. It is also pointed out that this type of job work does not attract any levy in Maharashtra.

Under the circumstance, the upcountry clients get their job-work done in

Maharashtra leaving the Gujarat units high and dry. Another major sufferer of this policy of the Gujarat government are the textile mills who constitute the main clients.

There are other problems, too, confronting the rubber goods industry in Gujarat. Most of the units are either run or owned by persons who have gained some working experience in manufacturing some specific range of products. Technical knowledge on a part is rather elementary. The units are not able to invest for testing machinery. Nor is there a standard laboratory in the state which can fail to grow over the years while in other states the rubber goods industry manufactures 35,000 different items. Compared to Maharashtra's consumption of 18 per cent of the national rubber consumption, in Gujarat it is a measly 1.8 per cent. This is particularly appalling because Gujarat has recorded the fastest industrial growth in the last decade.

The availability of natural rubber to the manufacturing units has also become a problem area as there is no state agency handling this aspect of the business. Consequently, the state units find themselves at the mercy of wide price fluctuations which rubber often finds itself in.

2000 EVACUATED AFTER TOXIC LEAK SCARE IN SOVIET UNION

Nearly 2,000 people were evacuated from Yaroslavl, 200 km north of Moscow, recently after volatile toxic chemical fluid began flowing out from a tanker in a goods train accident on the railway bridge over the R. Volga.

Troops of the Soviet chemical warfare units reached the spot and used ordinary pails to transfer the fluid flowing out into other tankers where special pumps were being brought to the accident spot, reports Tass.

The substance which leaked from one of the seven trucks derailed was not identified, but described as highly toxic and explosive.

Twelve members of the emergency services were hospitalised, the report said.

Sovietskaya Rossiya said a major effort remained to eliminate the threat to the environment. The contaminated earth would be removed from the top

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Polychem to expand plastics capacity

Polychem Ltd., a large producer of polystyrene, styrene monomer and other plastic products, is expanding substantially. The capital outlay on the approved expansion projects to be implemented by 1989 is placed around Rs. 37 crores.

The company has sought the government's permission to set up downstream projects for styrene, polystyrene and copolymers and also propylene products based on the Gujarat Petrochemical Complex to be located at Hazira. The capital expenditure on these projects would depend upon the government's clearance but could be as high as Rs. 60 to 70 crores in the initial stage.

The company's current working is said to be fairly encouraging with sales about 25 per cent higher than in the corresponding period of last year. Profit margins for the current year are also expected to be better in view of good price realisation for the major products.

The turnover for the current year to end on March 31, 1988, is expected to be nearly Rs. 85 crores against Rs. 65.43 crores during 1986-87 and Rs. 57.43 crores in 1985-86. The gross profit after interest is likely to show a rise of 20-25 per cent over that of the Rs. 5.58 crores of 1986-87. The company has earned a gross profit of Rs. 3.65 crores on sales of Rs. 39.94 crores for the first half of the current year.

It is likely that the dividend for the current year would be stepped up in line with the improvement in the earning. The company maintained the rate of equity dividend at 25 per cent for 1986-87 on the increased capital resulting from the one-for-two bonus issue of shares. This meant a distribution of 37.5 per cent on the pre-bonus capital. The earning per share (EPS) for 1986-87 worked out at around Rs. 11 which provided an excellent cover of over four times to the dividend distribution. The earning per share for the current year is expected to be higher despite the tax liability under Section 115J of the Income tax Act.

Production of polystyrene, ABS plastics and other products is expected to improve during the current year. The demand for the company's products continues to be brisk. The long-term outlook for the company is promising

in view of the fast growing demand for plastics and intermediates. According to the Kapur Committee on petrochemicals, the demand for plastics is expected to grow to 7.9 lakh tonnes in 1989-90 and further to 26 lakh tonnes by 2000 from the present 6 lakh tonnes.

The current expansion programme, involving an investment of about Rs. 37 crores, is being financed from internal accruals and borrowings. The programme includes the expansion of the ABS plant capacity at Baroda from 2,000 tonnes to 5,000 tonnes per annum at a cost of Rs. 8 crores. This expansion is expected to be completed in the last quarter of 1989. The demand for ABS plastics is currently placed at around 6,000 tonnes. Besides, Polychem ABS Plastics Ltd. also manufactures this category of plastics.

The company is also setting up a plant to manufacture 2,000 tonnes of polyvinyl alcohol at Nira near Pune at a cost of about Rs. 12 crores. This plant is expected to be commissioned by the end of 1989. The capacity of the vinyl acetate monomer (VAM) plant is being raised from 10,000 tonnes to

15,000 tonnes per annum. Besides, the company has embarked upon the modernisation of its existing styrene plant involving an investment of about Rs. 4 crores. The modernisation work is nearing completion and would augment the plant capacity by nearly 20 per cent to about 16,000 tonnes per annum.

Enthused by the ambitious perspective plan drawn out by the Kapur Committee, the management of Polychem has identified two large projects as downstream units of the proposed Gujarat petrochemical complex to be located at Hazira. The projects are for the manufacture of styrene, polystyrene and copolymers as well as propylene oxide, glycol, polyolefin and polyurethane foams. The potential for these products is said to be fairly large. The government has not yet taken a final decision on the setting up of the gas cracker at Hazira. Because of this, the clearance in respect of the downstream units is held up.

The management is, however, hopeful of getting a suitable share in downstream projects on account of the company's pioneering efforts and the impressive role played in the development of plastics in the country.

— Courtesy: Economic Times

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COMMERCIAL BANK LENDING:

Single-Window clearance under study

The introduction of 'single-window' lending by commercial banks is being looked into by an expert committee of the Reserve Bank and bankers feel that a single point appraisal, documentation and disbursal of loans is feasible.

This was indicated by the chairman of the Indian Banks Association, Mr. R. Srinivasan, at a banker-borrowers meet organised by the PHD Chamber of Commerce and Industry (PHDCCI).

In order to provide relief to the small-scale sector in getting payments from large units, the RBI had constituted a working group to examine the feasibility of setting up 'factoring institutions' which would look into the various factors responsible for sickness in the small-scale sector and advise the bank accordingly. The report of the working group is expected soon.

In view of the borrowers' difficulty in obtaining working capital along with term loans, it was agreed that working capital limits would be sanctioned simultaneously without fresh appraisal

once the state financial institutions had vetted the projects and approved loans.

His decision is expected to provide the much needed succour to industrial unity in Punjab, particularly those of Amritsar, who complain that banks insist on collateral security and personal guarantees from new units before sanctioning working capital requirements.

Mr. Srinivasan stated that measures initiated in early 1985 to tone up services in banks had started yielding results and the activity of each bank was being closely monitored.

The participants at the meeting which was chaired by the PHDCCI president, Mr. Manmohan Singh, included about 40 senior bankers representing almost the entire banking industry, says a chamber press note.

Mr. J. S. Varshneya, president, Delhi chapter of IBA, and CMD of Punjab National Bank, stated that in view of the stagnation in Punjab

a cell is monitoring the implementation of these measures to ensure availability of timely working capital in adequate measures and at reduced margins.

The bankers, however, did not favour the extension of such concessions at one go for four to five years as it would have an adverse psychological impact. They, however, conceded the need for extension on merits of the case.

Conceding the need for revival of sick units through special packages, it was stated that the RBI had issued clear instructions that no member of the consortium in the revival package can walk out once the package has been agreed upon by the consortium.

Mr. Varshneya announced that special branches were being set up by the Punjab National Bank to cater to the requirements of industrial borrowers and small-scale units.

Earlier, the PHDCCI finance, banking and insurance committee chairman, Mr. M. M. Mahajan, called for a fresh look on the credit-deposit ratio of states falling in the northern region with a view to improving it.

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MORE CHEMICALS IN EXIM BANK EXPORT LIST

The Export-Import Bank of India has expanded the list of products in the chemicals sector for export keeping in view the growth potential in their overseas sales.

The list now includes bulk drugs, pharmaceuticals and chemicals, under the bank's deferred payment programme, an Exim Bank bulletin said in Bombay.

The export of chemicals has recorded considerable increase to Rs. 923.5 crores in 1986-87 over the previous year's figure of Rs. 794.2 crores. The major product categories for export in 1986-87 were drugs, pharmaceuticals and fine chemicals (24 per cent), refractories and processed minerals (9 per cent), basic and organic chemicals (7 per cent) and automobile tyres and tubes, medicinal herbs and paints and varnishes, six per cent each.

While the Soviet Union accounted for the largest share such other advanced nations like the United States, West Germany, Japan, France, the United Kingdom, and the Netherlands were also importing Indian chemical products.

SSIs seek excise exemption

Small scale industries have urged the government to exempt them from the scope of excise duty. In a pre-budget memorandum submitted to the Union finance minister, the Bombay Small-scale Industries Association has said that the government's administrative expenditure is as much as Rs. 315 crores for "collecting, checking, preventing and auditing" the levy of an estimated total excise duty of Rs. 360 crores from the small scale sector.

Observing that it is ridiculous to collect this paltry sum by spending such a large proportion (about 85 per cent) of the levy, the association has also said that the levy on the small units sector formed no more than 2 per cent of the total collection of excise duty of about Rs. 18,000 crores from all industrial sectors.

The association has further pointed out that about 80 per cent of the country's excise duty collection is from the private and public sector giants like petroleum and steel units and the administrative cost of collection is very low unlike the cost of excise collection from the small sector units.

It has said that the remaining 18 per cent of the government's excise revenue comes from units engaged in refrigeration, air-conditioning, automobiles, rubber tyres and tubes, patented proprietary medicines, soaps, aerated waters and food products with reputed brand names.

Both these sectors collect in advance the excise duty levied on their products from their buyers, and as such could not have any problem in passing them onto the government. But the small scale units, which are generally at the weaker end of the bargaining counter, supply ancillaries, spares, raw materials and other products to larger units on credits ranging from 60 to 180 days. As such, even a small burden of excise duty on the small units could lead them to starvation of working capital and eventual death.

Pleading for total abolition of excise duty on the small-scale sector, the Bombay association has said that the government's average expenditure on excise duty collection from the small scale sector worked out to a staggering Rs. 20,000 per unit. Apart from

this colossal wastage, about 16.5 lakh small units are required to spend Rs. 165 crores on stationery and maintenance of excise records, all for yielding a government revenue of Rs. 45 crores.

If the government is not inclined to forego the revenue from the small units, it could substitute the excise levy with a flat rate of "tax for national development" as the following: Annual tax of Rs. 1,000 for units with turnover between Rs. 3 lakhs and 7.5 lakhs, Rs. 2,000 on turnover between Rs. 7.5 lakhs and 15 lakhs, Rs. 3,000 on turnover between Rs. 15 lakhs and 30 lakhs, Rs. 4,000 on turnover between Rs. 30 lakhs and 40 lakhs, Rs. 6,000 on turnover between Rs. 40 lakhs and 50 lakhs, and Rs. 7,000 on turnover between Rs. 50 lakhs and 75 lakhs. Such a restructured levy could yield a revenue of about Rs. 400 crores per annum, without having to incur any large administrative expenditure.

INDO-BRITISH STEERING GROUP ON COAL MEETS

The 15th meeting of the Indo-British joint steering group on coal began in New Delhi to discuss progress of on-growing British-aided coal projects and outline future areas of collaboration.

The British delegation is led by Mr. C. B. Benjamin, Under Secretary in the British Government of Trade and Industry and the Indian side led by K. R. S. Varadan, Secretary, Department of Coal.

With the support of aid grants of over £30 million in the last ten years, Britain has helped introduce advanced coal mining technology in India. The steering group will discuss the projects supported by the latest £31 million coal sector grant approved in March last.

Among other subjects on the agenda are, the British-built Amlori coal mine in Uttar Pradesh which is nearing completion and the planned collaboration on the development of the New Ghusik coal mine in West Bengal.

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ONGC's future 'probe' areas

Exploration in deeper waters, drilling of high temperature and pressure wells, optimisation of offshore structure designs to reduce cost and subsea completion to exploit remote hydrocarbon finds are some of the areas that will receive increasing attention from the Oil and Natural Gas Commission (ONGC) in the coming years.

ONGC sources said that a deep water and continental slope exploration programme would be launched in various phases between 1989 and 1991, beginning with acquisition of seismic lines data processing. Its interpretation, drilling at identified locations and production will follow.

ONGC has also re-entered the logistically and geologically complex areas of Himachal Pradesh and Jammu and Kashmir and Asia's deepest well is being drilled at Surinsar near Jammu, the sources said.

Targered to be drilled to a depth of 7000 metres, the well is expected to be completed by March, 1990.

Two charter-hired deep drilling rigs deployed at Jawalamukhi and Nurpur in Himachal Pradesh are targered to drill upto 6000 metres.

Besides, another super deep rig on charter-hire will be inducter during 1989-90 to drill upto 7000 metres at Surinsar in Jammu and Kashmir, the sources said.

ONGC has also taken up three locations, including two deep locations, for drilling in the Cambay Basin, where oil has been observed at depths of 6000 metres.

In offshore areas, giant single piece jackets are planned to be installed at some locations, subsea completion, which promises production from deep-water wells, has ended in the western offshore area, they said. The Government has also cleared the introduction of this technology as a research and development project at a cost of Rs. 20.94 crores in the Krishna-Godavari Basin.

According to the sources, several innovations in drilling technology have helped reduce costs in the Eastern Region and will be extended to other regions.

ONGC hopes to increase its production of oil and oil equivalent of gas by 3.25 million tonnes during 1988-89.

The sources said ONGC plans to achieve a crude and gas output target of 36.45 million tonnes in 1988-89 as compared to 33.20 million tonnes in 1987-88.

A Plan outlay of Rs. 2350 crores has been made for 1988-89 compared to Rs. 2056 crores in 1987-88, they said.

The sources said the reserves to production ratio had also gone up that is there are more reserves today to sustain the accelerated rate of production than there were six years ago.

Against hydrocarbon reserves of 3305.37 million tonnes in 1981, the figure rose to 4062.61 million tonnes last year, they said.

Efforts to bring in gas to 100 per cent utilisation of natural gas, the availability of which will increase by 1580

million cubic metres in 1988-89 compared to 1987-88, they said.

The foreign exchange savings as a result of natural gas utilisation is estimated to be around Rs. 1540 crore in 1988-89 compared to Rs. 1180 crores in 1987-88. Most of these savings are due to gas utilisation in the fertiliser and power sectors as well as industrial fuel and Liquefied Petroleum Gas (LPG) production, the sources said.

OPEC CHIEF EXPECTS STABLE OIL PRICES

The president of OPEC said recently he was confident a new production accord was working and that oil prices would remain stable, without repeating their sharp fall in 1986.

Rilwanu Lukman, who is also Nigeria's oil minister, said that the 11 OPEC members which signed an agreement in December to limit their production to 15.06 million barrels a day had in fact produced less than that in January.

Lukman is in Davos for what is billed as an "energy summit" of 27 to energy executives and officials, including the oil ministers of Saudi Arabia and non-OPEC member Norway, on the fringes of this year's world economic forum.

The December agreement of the Organisation of Petroleum Exporting Countries was adopted to prevent a renewed slide in oil prices.

In the wake of it, prices did steady at around 18 and 17 dollars a barrel, still below OPEC's benchmark of 19 dollars.

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ONGC mechanism to run vehicles on CNG

The Oil and Natural Gas Commission (ONGC) has recently developed and perfected a mechanism to run vehicles on compressed natural gas (CNG), which would revolutionise the transport sector by cutting cost barriers.

An ONGC spokesman said that a major headway had been made in the optimal utilisation of CNG in the transport sector, instead of conventional liquid fuels like petrol or diesel.

He said the trial run conducted by the ONGC at Rajamundry (K. G. Project in Hyderabad), Agartala (Tripura Project) and Bombay for the conversion of its vehicles to be run on CNG, had also proved highly cost effective, besides resulting in smoother and pollution-free vehicle performance.

The spokesman also said that the switchover to CNG system, would also bring an estimated saving of Rs. 50 for every 100 km for a diesel-driven vehicle. The cost of conversion for a vehicle to be run on the CNG system was worked out to be a mere Rs. 10,000, he added.

Besides this, he said, the CNG system also reduces the carbon monoxide and sulphur oxide emission to almost zero level and its octane content also eliminates the poisonous lead compounds which are in significant numbers in environment.

The CNG fuel, besides being extremely economically viable, helps in avoiding air pollution, by reducing pollutants in the exhaust gas.

Another advantage of this dual system is instant changeover to 100 per cent diesel fuel system.

As per the latest statistics, the transport sector was the bulk consumer of the total energy produced from oil (56 per cent) and introduction of the CNG system, as an alternative to the conventional fuels, is in line with the ONGC's objectives of reducing dependence on oil and the development of alternative source of energy, he said.

The spokesman said most vehicles using conventional liquid fuels were powered by multicylinder four-stroke reciprocating internal combustion engines, using either compression ignition or spark ignition.

Therefore, the spokesman said, there would be two options available for the conversion of compressed ignition type engines. The first being a mixture

of 80 per cent of CNG, mainly methane and 20 per cent of diesel used as a continuous fuel.

He said this alternative would be preferred by all as it does not require any modification in the normally supplied compressed ignition type engines.

Whereas in the second alternative 100 per cent CNG could be used, requiring a major modification in the engines, besides increasing the expenditure on conversion, it also makes the vehicle exclusively dependent on the use of CNG.

However, the spokesman said this system would be neither preferred nor could be successful, till such time that enough distribution outlets of CNG were made available in the country.

In the 80:20 gas and diesel system, the diesel was mainly used for igniting the gas and does not contribute to the power generation and the power generated by the engine would be dependent on the quality of gas supplied.

He said the conversion of spark ignition (petrol) engine to the dual fuel

(gas and petrol) mode of operation could possibly be more popular than diesel engine conversion because of its technological ease and greater cost differential between the CNG and petrol.

One cylinder could store six to seven cubic metres of gas, he added.

The spokesman said that the positioning of cylinder was also entirely at the option of users and it could be installed at any convenient place. This place could be below the chassis of trucks and buses after taking due care of minimum road clearance or they (cylinders) could be mounted in passenger compartments beneath the seats.

In the case of motor cars, the cylinders could be mounted in the boot of the vehicles at the cost of space of luggage or it could also be mounted on the roof of the vehicle with due weather protection system.

Besides the Italian and New Zealand experience, where CNG is being used as automobile fuel, has shown that it could be safer than the conventional fuel-driven vehicles.

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Oil prospects bright in cauvery basin

There are 'indications' of oil in the well at Nannilam (Thanjavur district) in the Cauvery on-shore basin, according to Col. S. P. Wahi, ONGC Chairman.

After visiting drilling sites at Nannilam and Komarakshi (South Arcot district), Col. Wahi said that 'repeat formation testing' was on at the Nannilam well. Eight zones had been identified in the well for testing.

Crude production from the new GS-16 well, off the Krishna-Godavari coast, would begin in 12 to 18 months. With a potential of one million tonnes of oil a year, it was expected to fetch a revenue of Rs. 200 crores annually. "It is a good find. Further, it gives us new directions for exploration in the area," Col. Wahi said.

On the prospects of oil or gas find off Cochin, where drilling is now on, Col. Wahi said the area presented a lot of geological problems. Drilling was going on smoothly, but the target depth was yet to be reached.

Huge gas reserves

Huge gas reserves had been discovered in the basins of Rajasthan, Bombay Offshore, Tripura, Krishna-Godavari and to some extent in the Andamans. The chances of gas finds in the basins of Jammu and Kashmir and Himachal Pradesh were bright.

The gas reserve in India as on January 1, 1987 was 17.6 trillion cubic feet. This was expected to go up by 20 to 25 per cent by the Seventh Plan end. The natural gas production in 1986-87 was 9.81 billion cubic metres.

Gas utilisation today was 76 per cent compared to 58.75 per cent in 1981-82. The ONGC had launched a massive drive to improve gas use, it had planned a "national gas grid" to be implemented in phases as optimum use of gas was possible only through a massive distribution system. The grid would provide the desired flexibility for natural gas use and reduce regional energy imbalances.

Biggest consumer

Quoting latest statistics, Col. Wahi said the transportation sector was biggest consumer of the total energy produced from oil (56 per cent). Recently a pilot study had been started on the introduction of compressed natural gas for the oil-intensive transportation sector.

The 14-km-long pipeline from Narimanam wells to supply gas to Nagapattinam Steel Rolling Mills will be commissioned on February 10.

The entire Cauvery basin had good prospects. Many small finds were expected which together would yield large amount of crude.

Col. Wahi said that 52 per cent of the recoverable reserves of oil in the world were in 49 large wells and balance in 30,000 small fields.

\$295M. IBRD LOAN TO DEVELOP GAS RESERVES

The World Bank has announced a \$295-million loan to help India develop its natural gas reserves and reduce dependence on imported fuel.

"Production from India's oil field is reaching a plateau at a time when the industry is demanding more energy," the announcement said.

"India will be more able to meet its demand by tapping into abundant natural gas reserves estimated at 7 billion cubic metre, equal to about 5 million tonnes of oil."

The Bank recently said its loan would help plan development and use of gas resources and construct processing facilities and a pipe line from Heera offshore gas field to the mainland.

The loan carries variable interest linked to the cost of borrowing, currently 7.72 per cent.

ALUMINA EXPORTS TO BAHRAIN

The public sector National Aluminium Company (NALCO), sent the first consignment of 35,000 tonnes of alumina to Bahrain on Feb. 8.

According to the NALCO Chairman and Managing Director, Mr. K. V. Panthulu, the consignment was part of the 2.5 lakh tonnes of alumina to be exported as per an agreement reached with the Hydro Trading Company of Bahrain.

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ONGC chief sure of meeting 7th plan target

The chairman of Oil and Natural Gas Commission (ONGC), Col. S. P. Wahi asserted that the commission could attain the Seventh Plan Production target of 34.5 million tonnes of crude oil. His optimism was based on the oil findings in Assam, Krishna Godavari, Bombay off-shore and Gandhar. Col. Wahi, who was chatting with newsmen in New Delhi, was responding to queries regarding the commission's ability to hit the Seventh Plan target. The doubts arose in view of the fact that so far only about 30 million tonnes of oil had been produced by ONGC.

Similarly, he said the field life of Bombay High could well double following the discovery of basement oil there. He said the reassessment of Bombay High had been taken up following the extension of the western limits and the prospects of deeper layers.

In addition, three western offshore oil fields, namely, Heera, Panna and Ratna had been contributing to its total output.

The ONGC chief explained that an aggressive exploration and an innovative exploitation strategy adopted by the commission would lead to an 80 per cent cumulative increase in output of oil and oil equivalent of gas comprising a 60 per cent increase in crude and 201 per cent in natural gas during the Seventh Plan as compared to the Sixth Plan.

SCOPE FOR SAVING OIL SEEN

Shortage of oil supplies could become one of the major sources of anxiety for the country, according to Mr. B. G. Rudrappa, chairman, Karnataka Electricity Board.

Inaugurating the national seminar on 'Tribology and fuel utilisation in power plants' in Bangalore on February 3, he said that oil had become one of the major sources of energy and even with a consumption level much lower than that of western nations the country had to import oil. Among the three important sources of energy i.e., coal, oil and electricity, the share of oil

had recorded an increase over the years from 43.4 per cent in 1960-61 to 49.9 per cent in 1984-85. The share of electricity during the same period had gone up from 16.7 per cent to 31.4 per cent while that of coal had come down from 39.9 per cent to 18.7 per cent, he said.

Mini power plants, he said, were becoming more and more popular due to the shortage of power supply and in Karnataka alone over 100 mw of diesel plants are added every year by industries. According to him, studies conducted by the KEB in respect of the Yelahanka project revealed that about 1.4 lakh kilo litres of fuel worth about Rs. 56 crores could be conserved each year by setting up a large diesel plant instead of scattered small ones.

Mr. B. K. Bakshi, director (marketing), IOC, Bombay, in his presidential address, said that by the year 2000

about 105 million tonnes of refining capacity would be needed to meet the projected demand for oil in the country. The current refining capacity, he said, was around 45.5 million tonnes. Three more refineries at Karnal, Mangalore and the Assam Accord Refinery and Mangalore has been sanctioned. The capacity of the Mangalore refinery may be expanded from 3 metric tonnes per annum to 6 MTPA at a later stage, he said.

Mr. Bakshi said that the production of crude in the country in 1987-88 was expected to be over 30 million tonnes and still 18 million tonnes of crude oil would have to be imported. Another 3 million tonnes of petroleum products to meet the growing demand would also be required and the total outflow of foreign exchange for all this would be over Rs. 3,800 crores.

Speaking about lubricant oil he said that this would have to be made from imported crudes as the indigenous crudes did not give the desired yield of lubricating oil base stocks.

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CIL poised to attain targets

Coal India Ltd. is well poised to attain its target of 153 million tonnes in the current fiscal. With a production of 124.85 million tonnes in the April-January period, at a growth rate of 11 per cent, CIL is required to produce only 33.15 million tonnes in the remaining two months. The production has been higher by 12.32 million tonnes in the first 10 months. This year CIL produced 16.58 million tonnes — 1.73 million tonnes more than the January '87 production.

Despatches were also higher during the month at 13.98 million tonnes as against January '87 despatches of 12.66 million tonnes. In the first 10 months of the current financial year despatches increased to 122.31 million tonnes — an increase of 10.24 million tonnes over the same period in the preceding year. Higher despatches

during the month and in the year so far were possible due to increase in daily average loading of four wheeler wagons. In fact, in January '88 the daily average loading increased to 12,607 tonnes which is only lower by 244 tonnes than the highest-ever loading average recorded in March '87. The demand of power sector was met in full and the overall demand satisfaction for all consumers during the April-January period has been 92.4 per cent.

Overburden removal continued to show sharp increase at the end of January '88, overburden removal during the current year totalled 171.33 million cu.mtrs. as against the target of 152.08 million cu. mtrs and actual performance of 146.33 million cu. mtrs in the same period last year — a growth 17.1 per cent.

Coal stocks at pitheads increased 27.51 million tonnes — an accretion of 1.93 million tonnes during the month of January.

GERMAN CHEMICAL INDUSTRY AT TECHNOGERMA

The German chemical industry will be one of the largest exhibitors TechnoGerma India '88. This is in line with its rank as the world's leading exporter and the fourth largest producer of chemical goods.

The economic development of the German chemical industry has been strongly affected in 1986 by the drastic deterioration of the dollar exchange rate and a fall in crude oil prices. Both have resulted in pressure on sales prices and had an adverse effect on export business.

On the other hand, there has been a relief on the cost side with regard to the purchase of raw materials dependent on crude oil, which have allowed the chemical industry to absorb, in part, the enormous price pressure on the export side. Thus, it has been possible to make the necessary price concessions to preserve market share. These price concessions were one of the factors minimising the effects of the dollar exchange rate on exports.

As a result of this development, the German chemical industry's turnover has shown a declining trend since early 1986. On average, 1986 saw a decline in turnover of some 6 per cent DM 140 billion. Foreign business was under stronger pressure than the internal market. When taking turnover as criterion, the Federal Republic of Germany's chemical industry, nevertheless, remains number four worldwide with a share of 7.7 per cent, after the U.S., Japan and the USSR. As a result of the marked price movements, pure nominal turnover values are hardly indicative of the industry's development. Chemical business thus remained, in real terms, at the high level of the years 1984 and 1985.

In 1986, the German chemical industry spent some DM 8.5 billion on research and development. In 1987 it will invest DM 9 billion. This corresponds to DM 25 million per day. These data show, in an impressive way, that the German chemical industry makes the necessary efforts to master the tasks of the future.

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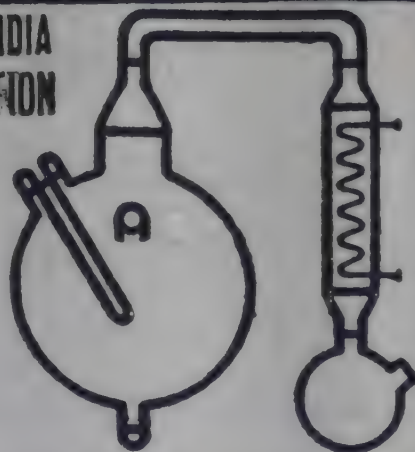
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PROCEEDINGS OF IDMA ANNUAL MEET

Drug Price Control: Panel to Review Complaints

A three member panel, headed by an IAS officer, will look into the complaints of the drug manufacturers regarding fixation and revision of drugs and formulation prices". This was announced by Mr. H.K. Khan, Secretary, Department of Chemicals & Petrochemicals at the 26th Annual Meeting of the Indian Drug Manufacturers Association at Bombay on 2nd January 1988. Mr. Khan was the chief guest. He also assured the members of IDMA that the Bureau of Industrial Cost & Prices would set up a system by which every application for adjustment of prices could be decided within 30 days. The Minister of Industry, Mr. Appaji Rao who could not attend the function sent a message and his speech was read out by Mr. R.K. Mathur.

Earlier, the outgoing IDMA president Mr. I.A. Modi welcomed the chief guest and others. The incoming president, Mr. V.U. Shah also spoke about the numerous problems faced by the industry. Mr. H.K. Khan released the IDMA trophy and also gave out IDMA Research Awards and G.P. Nair Awards. Mr. N.I. Chitambar, Hon. Secretary, proposed a hearty vote of thanks. Later in the afternoon three technical papers on New Drugs, New Dosage Forms and Innovations in Machinery used in manufacturing drug formulations were presented.

The following pages are published summaries of the speeches:

SPEECH OF MR. I.A. MODI, THE OUTGOING PRESIDENT OF IDMA

In his speech, the outgoing IDMA president, I.A. Modi, listed out certain important measures to be considered by the Government in implementing the Drug Price Control Order. He said (in part):

"It is a matter of pride and satisfaction that though our Association started small in 1962 with 26 years of incessant service to the national sector of the pharmaceutical industry has grown into a youthful and vibrant organization of over 700 strong members from small, medium and large sector."

Policy

From the very beginning, the Drug Policy of the Government of India, has been exceptionally encouraging. As a result, the pharmaceutical industry bolstered itself up to consolidate its position and grow in a way not known in any third world country.

"After the release of the drug policy of 1978 and DPCO 1979, the Government's declaration on 'Measures for Rationalisation, Quality Control and Growth' in December 1986 and the announcement of the DPCO in August, 1987 have been two major events that would steer the pharmaceutical industry towards achieving the goal of 'Health for All by 2000 A.D.'"

"Further, the Government's step to reduce the control basket from 347 to 166 drugs and the three categories to only two has been another move in the right direction of reducing the span of control. Even the abolition of uneconomic and unworkable mark-ups of 40% and 55% to MAPE of 75% and 100% in Category I and II respectively is a highly encouraging measure taken by the Government. Category I drugs which are almost 10% of the control basket are used for National Health Programmes.

"The MAPE of 75% in this case is a bare break-even. In spite of this bare break-even, the national sector has accepted the challenge which stands amply demonstrated in the fact that 75% of these important drugs that yield no profit to the manufacturer, have been produced by the National Sector only.

"In drawing the list of drugs under Category II, the Kelkar Committee has done a commendable job. In extending the term of the Committee by six months so that it could study the anomalies arising out of the implementation of DPCO 1987 and suggest solutions for the same, the Ministry has amply shown its seriousness of purpose in solving the genuine problems faced by the industry.

"The recent guidelines about the combination products where the category is to be decided by the therapeutic effect of the active ingredient in the product, the notification to exempt the SSI units from the purview of price-related paragraphs of DPCO 1987 for Category II items and the bringing out of the long-awaited DPCO 1987 itself make us to congratulate you Sir, and Shri R.K. Jaichandra Singh, the Hon'ble Minister of State for Chemicals and Petrochemicals and his team of others led by Shri H.K. Khan who have reposed their confidence in the industry. For this, we are grateful to them.

"We are sure your favourable consideration in the following would further pave the way for the industry to progress with greater ease and confidence.

i) The price notifications under the DPCO are considered as legislative measures. In that case the industry has no choice but to implement the prices fixed by the Government within the prescribed period, subject to a request for review. Since price fixation is considered as a legislative measure, we believe that the reviewing authority should be different from that which fixed the prices. Hence there should be an appellate body—quasi-judicial authority—for the quick and time-bound disposal of the review applications.

ii) While revising the conversion norms and the packing charges for which the Government has already appointed a Committee consisting of Dr. D.K. Shankaran, Dr. M.A. Patel, Shri Radhakrishna Murthy and Dr. Appaji Rao, not only the increase in input cost since 1974 but also an estimated increase in the coming five to seven years should be taken into account. Since packing material used has direct linkage with the quality of the product, it should be considered on actual basis. A mechanism such as indexing which automatically takes care of price escalation of inputs can also be considered.

iii) Local taxes in the case of drugs should be re-defined so that State and Central Sales Tax may get properly explained and along with the Turnover Tax imposed by some of the States, it should be allowed to be recovered from the customers. Since drugs are a price-controlled commodity, there is no scope for charging more than the labelled price. The Central Government should issue suitable directives to the State to that effect.

iv) The price of controlled bulk drugs were fixed three years back. As such, it needs immediate revision. Along with that, the revision of prices of formulations should also be made.

In the present set-up, BICP is able to process 14 to 18 price applications in a year. At such a rate, the applications for 166 bulk drugs as listed in Category I and II would require more than a decade to process. A suitable alternative to overcome this long-drawn pricing procedure could be that some general norms be laid down by the BICP. Based on those norms, each manufacturer works out his prices; and, along with a chartered accountant's certificate submits the same for random checking by the Government. This suggestion may kindly be considered by the Government.

v) Factors like bonus, wage hike, provision for bad debts, brokerage and commission,

cost of effluent treatment and other similar expenses should be taken into account on actual basis while working out the price for bulk drugs.

vi) For the immediate implementation of the new DPCO, the notification regarding the professional service charge of 50 paise per prescription and the revised trade margin should be issued without further delay. It would not only honour the agreement reached on 1.12.1987 between the trade and the industry associations in the presence of the ad hoc Committee appointed by the Ministry, but would also value the recommendations made by the Kelkar Committee about the professional service charges prevalent all over the world.

vii) The simplified forms for non-scheduled drugs designed by the Associations and already submitted to the Government may please be approved at the earliest.

viii) Decontrol of veterinary products — an input of animal health is a genuine request as they contribute to the prosperity of the rural economy. This is also recommended by the Kelkar Committee.

ix) Similarly, the decontrol of bulk drugs for SSI units is very much justified.

Bulk Drugs

If the Drug Policy of the Government has been the one encouraging factor for the all-round growth of the industry, then its approach towards bulk drug has the one impetus without which it would not have been possible for the industry to set our country apart as one of the few developing nations that have both bulk drug and formulation production plants. More impressive has been the fact that the national sector now manufactures most of the important and innovative bulk drugs like Trimethoprim, Sulphamethoxazole, Corticosteroids, Metronidazole, Ampicillin, Erythromycin, Salbutamol, Mebendazole, Tinidazole, Ethambutol and few others that are of international standard. Many of these bulk drugs are being exported and the industry earns valuable foreign exchange for the country.

"In the production of bulk drugs, the role of SSI sector needs a special mention. From 7% in 1975-76, it has gone upto 21% in 1984-85. We congratulate the technocrat entrepreneurs of the small sector and urge the Government to take all measures to channelise their efforts in the development of appropriate technology, cost-efficient processes and new drugs. For it has been amply proved by various research studies that creativity and innovations are the natural forte of the small sector

and we have to make the best use of that.

"Against the commendable performance of the national sector including the SSI sector, the foreign sector has shown utter indifference towards the production of bulk drugs. In 1984-85 these foreign companies manufactured bulk drugs worth Rs. 68 crores only. As compared with that, the national companies produced bulk drugs worth Rs. 309 crores, thereby achieving an average growth of 20% whereas the foreign companies have remained stagnant over the period of last three years.

"But there is an urgent need to correct the anomaly between the import duty on raw materials which is 105% and on drug intermediates which is 147.5%. It is worth considering as to how an indigenous manufacturer can produce a bulk drug at a competitive price by importing a drug intermediate after paying 42.5% more on duty alone. This anomaly does not gel with the positive measures on rationalisation which the Ministry has formulated in order to ensure that cumulative incidence of duty on bulk drugs remains higher than that on the inputs and drug intermediates. May I, on behalf of the Association, request you to look into the matter on a priority basis and oblige.

"Another hindrance in the indigenous production of bulk drugs has been the Central Excise levied on captively produced drug intermediates under Central Excise Notification No. 217/86 CE of 2.4.1986 or 234/86 of 3.4.1986. These notifications may kindly be amended with retrospective effect.

"It has been rightly observed by the Kelkar Committee that in the pharmaceutical industry, each bulk drug is a separate production activity in terms of technology; and for the production of one drug, more than one route can be adopted. Against this backdrop, drug manufacture is a research intensive industry which also has a very high rate of obsolescence. As such, deduction of capital expenditure on research work hitherto allowed under Section 35 of the Income Tax Act should be restored by suitably modifying the provisions of the Direct Tax Laws Amendment Bill 1987 which has omitted the provisions relating to allowance of capital expenditure on research activities.

"While calculating the ratio parameter between bulk drugs and formulations production, the quantum of bulk drugs purchased from the indigenous manufacturers should also be taken as inhouse production. Such a measure would encourage and support the SSI sector in the manufacturing of bulk drugs

National Sector

"If the Drug Policy in general and the place given in the same to the indigenous production of bulk drugs, in particular, have contributed to the immense growth of the national sector, then the national companies, by which I mean the **wholly-Indian companies**, in turn, have also proved themselves worthy of all the confidence and trust the Government has reposed in them. They have both horizontally and vertically, contributed to the growth of the industry in the country.

"However, now a point has been reached where it has to be decided whether the wholly-Indian sector has to sulk behind FERA and ex-FERA MNCs or would be allowed to play a more prominent role by giving it a preferential treatment.

"There are reasons for us to state this. Till date, we have been summarily bracketed with ex-FERA MNCs; and this, unfortunately, has been perhaps the greatest limiting factor in the growth of the wholly-Indian companies. In every respect, it is an act of unequal growth being yoked together.

"I take this opportunity to suggest some measures that would immensely help in the effort:

i) There should be a sectoral list of drugs divided into two categories — one for wholly-Indian Companies which, of course, includes public sector companies, and another for FERA and ex-FERA MNCs. Criteria for such allocations could be the economic sale, technology and the pricing of products.

ii) On the basis of the criteria laid down for delicensing in Para 6.5 of Measures announced in December 1986, those drugs in respect of which the Association has already made its representation should be deleted from the delicensed list.

iii) It should be made obligatory on the part of both FERA and ex-FERA MNCs to export 25% of their production so that on the one hand valuable foreign exchange is earned and, on the other, the domestic market is further eased to accommodate the wholly-Indian national companies.

iv) FERA and ex-FERA MNCs should be pressed to manufacture the bulk drugs in an open list under the 1978 policy and also manufacture the high technology bulk drugs from the basic stage as spelt out in paragraph 1 of Drug Policy 1978.

v) FERA and ex-FERA companies having a turnover of more than Rs. 5 crores should

required to have (a) R & D facilities in the country on which capital investment should be at least 20% of their net block and (b) spend at least 4% of their sales turnover on recurring expenditure on R & D facilities laid down in para 41 of Drug Policy

In view of the solid past performance of the multinational companies and growth potential they hold, the Government needs to frame the policy in such a way that the real pharmaceutical industry is gradually enabled to play its global role. The Government has to remember that 60% of the world drug production is in the hands of 61 MNCs, of which 20 companies hold 43% of the total output and 10 alone control 28% of the total. If precautionary measures are not taken and preferential treatments are not given to the wholly-national companies, then in such an environment of dominance, how can the Indian industry achieve international dimension? How can they play their destined global role? Besides, if in our own country, we cannot get preferential treatment, where else can we expect to get it?

Loan Licence

In an industry where product obsolescence is frequent, the survival of a small unit has always worked out on so many counts. One such count is provided by the loan licensing system which not only strengthens the economic viability of a unit by utilising its spare capacity and its structure facilities available, but also builds the entrepreneurial base for the industry by providing platform for trials to the technocrats.

The decision of the Government to abolish the loan licensing system by the end of 7th year has, therefore, come as a real setback, especially in view of the fact that such a practice in the form of "Contract Management" is prevalent even in developed countries like USA, UK, Canada and Japan.

It has been put forth that misuse of facilities and compromise on quality has compelled the Government to take this unpleasant step. But, Sir, the proposed GMP statute and other provisions in the Drugs & Cosmetics Act, should be utilised to regulate the use of the system.

In view of our various memoranda presented to the Health Ministry and our continuous dialogue with them, we are hopeful that the system will be at least be continued till 1995. Our confidence is based, not only on the positive response of the concerned officials in the matter, but also because GMP conditions are becoming statutory and a fair

trial to the loan licence system under the new GMP condition would be most appropriate and justified.

"Further, the exemption accorded to SSI sector from the purview of price-related paragraphs of DPCO 1987 for Category II items should also be applicable to the loan licence manufacturers.

"We also request the Government to allow the production of bulk drugs on loan licence in the established plants where large idle capacity is available for production. This facility will also help the talented technocrats, who have acquired know-how at the experimental level, in developing the capability to produce on a commercial basis, provide extra resources to execute export orders and thus earn foreign exchange for the country.

"The abolition of the Drug Price Equalisation Account (DPEA) in DPCO 1987 is a welcome measure by the Government.

Patents Act and Paris Convention

"The Indian drug industry has the pride of introducing most modern products and processes within a relatively short span of time and at a price much cheaper than that in the world market—cheaper by 50% to 150%. We can be legitimately proud of manufacturing indigenously drugs like Pyrazinamide, Nifedipine, Ampicillin, Amoxicillin, Naproxen, Mefenamic Acid, Piroxicam, Pindolol, Dextropropoxyphene, Vinblastine, Glibenclamide, Salbutamol, Mebendazole, Captopril, Cimetidine, Ranitidine and many more. The credit for this goes to the Indian Patents Act, 1970. Under this Act, it is only the process which is patentable and not the product itself. For drugs and chemicals, the benefit of "automatic licences of right" has been provided. Also, India not being a member of the Paris Convention, could avoid the monopolistic practices existing in the international market and thereby keep the multi-channel import of bulk drugs as well as the introduction of the latest technology without legal constraints.

Export Need

"It is needless to say that our unfavourable trade balance points clearly to the need for increasing our export thrust. It is more than obvious that the growing acceptance of Indian products in the international market and the induction of new technology make exporting of drugs a favourable proposition for the industry in every respect.

"What is required most is the blessing of the Government by way of implementing the one-window system where the problems like

- * immediate availability of Advance Licence for raw materials
 - * approval of promotional measures, sending of samples, and employment of field staff
 - * sanction of adequate rate of commission
 - * on the spot assistance in shipment problems at concessional rates
 - * immediate payment of CCS and duty drawbacks
 - * concessional finance etc.
- are tackled on a time-bound basis.

Industry and the Consumer

"Our Association in particular and the industry in general firmly believe in the need for taking a consumer-oriented approach. In recognition of that, we have formed a consumer grievance cell and it is hoped that each individual member would try to have one of its own. It would not only help in the understanding and appreciation of consumer problems but would also lead to a regular flow of views from both sides.

Traditional Medicine

"The long and still-going-strong tradition of herbal medicines has attracted the attention of all concerned. The recent Third UNIDO Consultation Committee of Pharmaceutical Industry has very rightly discussed "Medicinal Plants" as a main topic on its agenda. The production of herbal drugs should be integrated in the National Health Programme. A sound policy back-up for encouraging the cultivation and collection of medicinal plants on a commercial basis should be encouraged. "Herbal Harvest" would perhaps add a new dimension to the cash-crop activities in the agricultural sector. Research studies on standardisation and preparation of herbal drugs should be undertaken. The development of suitable technology for processing as well as the genetic improvement of the medicinal plants should be initiated. The present practice of exporting herbal products as crude drugs can be reduced if such policy back-up for modernisation is provided."

SPEECH OF MR. V.U. SHAH

Mr. V.U. Shah, the incoming IDMA President, enumerated a number of problems faced the industry today. He said in his speech (in part):

"Ours is a industry dedicated to the noble cause of serving the ailing people of our country. In other words we are the heralds of health to the millions of suffering people of our country. The primary duty of both the industry and Government is to find ways and means to produce quality medicines at a competitive price for the millions who are silently suffering and bearing the pain thereof simply

because they cannot have access to the life saving medicines at the opportune time and at an affordable price. On the other hand it is rather ironical to note that both the prices of medicines and its distribution cost in India is the cheapest compared to any where in the world!

"Today the drug industry is beset with a lot of problems and particularly the small sector is reeling under the pressure of meagre resources and is passing through a crisis on account of the absence of the required climate for its better growth. However, we shall be pointing out some of the main areas where immediate attention of the concerned authorities is required.

Loan Licensing System

"You may be by now aware of the recent notification No. 638 dated 21.12.1987 issued by the Central Government with a view to phase out loan licencing system in the country. The seeds of the notification were already sown in the policy issued by the Government in Para 4.4 of 'Measures for rationalisation, quality control and growth of drugs and pharmaceutical industry in India'. At a time when the small scale units are passing through a very difficult time and are hard pressed with the financial constraints, this proposed amendment has come as a shock to the loan licencing units.

"There could be far reaching consequences of this move of the Government as over 8000 units will face closure and put over 3 lakhs of people out of job and financial institutions who have advanced finances to these units as well as units manufacturing for the loan licences will be left to their fate.

"Is it not the fact that SSI loan licensing units have contributed to the lowering of the prices of medicines on account of their cost effective (low cost of labour and other overheads) production programme? Is it not the fact that SSI loan licencing units have helped to reach the medicines to the nook and corner of the country? Is it not the fact that these SSI loan licencing units do not manufacture the medicines themselves but get them manufactured by the approved manufacturers and have their products tested by the approved Public/Government testing laboratories?

"Small Scale Loan Licencing Units are responsible for keeping the prices of other companies under control. We do not understand the rationale behind this proposed amendment and if quality control is the reason, Government should enforce GMP rigorously. To our opinion these units will be striving to maintain quality as it is a question of

their prestige and survival. There could be double watch on the quality assured from both the job worker and the medium or large loan licencees. On the one hand the Government is forcing these aggrieved small scale units to keep their manufacturing facilities idle and on the other hand will be putting pressure on the other small units to open up the manufacturing facilities which will involve a huge investment on plant and machinery and other required infrastructure which is a national wastage of resources.

"Government has taken this decision in haste without weighing the pros and cons of the problem and has not taken into confidence any section of the pharmaceutical industry and the people concerned. To our knowledge from reliable sources none of the committees have ever recommended to discontinue loan licencing system in the country. We trust the Government will understand the disastrous implication of this move and give justice to the aggrieved SSI units putting their apprehension and fears (of a slow and steady death) at rest within the shortest period of time.

"Besides the Government is not treating the loan licencing manufacturers in part with the other SSI units and has deprived them of the central excise benefit. We understand that the Government is committed to help SSI units and therefore we appeal the Government to grant this excise benefit to these loan licencing units and look into the matter sympathetically and scrap this move of abolishing loan licences for the benefit of the small units and national sector as a whole without further delay.

In-house testing facilities and Public Testing Laboratories

"While it is encouraged and recommended to have minimum quality control facilities to be installed at each manufacturing unit, it may not be a viable proposition to force the individual manufacturers to set up full fledged testing laboratories. Firstly this will call for a massive investment and employing of well qualified personnel which a small scale unit cannot afford. Secondly, can we have the ethical justification of these in-house testing laboratories and the quality assured when the products are tested and certified by the employee of the manufacturer himself. Thirdly, the small manufacturer will not be able to maintain these laboratories and utilise the facilities to the fullest extent as it will be a very costly proposition. Therefore what we would suggest is to establish common testing laboratories at convenient places on co-operative basis and public testing laboratories at the important commercial centres and the major port cities in the country. Manufacturers thus can

avail of these facilities and can speed up process of getting their products tested.

SSI units to be excluded from price co

"Over the years SSI units have rendered significant contribution to the increase in production and lowering of price of bulk drugs. If we have achieved self sufficiency in drugs production the major part of the duty goes to SSI units. Considering this point it was unanimously passed in National Development Council for Drug Pharmaceuticals that SSI should be free from price control both in formulations as well as bulk drugs. Even today 80% of the bulk drug production comes from this sector alone. Hence it is imperative that SSI units should be free from price control both in bulk drugs as well as category I items.

Rationalisation of duty structure

The duty pattern in our country is very irrational. It needs to be rationalised in order to motivate the bulk drug manufacturers to step up production and enhance their export performance. At times duty on the drug intermediates (120%) is more than the finished products (100%). On account of this very duty structure bulk drug manufacturers, particularly small scale units and SSI technological units are the worst sufferers leading to stagnation of bulk drug industry.

Taxes on Medicines

Perhaps you may be surprised to note that a poor ailing consumer today has to pay almost 48 paise of tax on every rupee worth of medicine he buys. Some of the life saving drugs are beyond the reach of the common man. Can we justify the following taxes levied on medicines in keeping with the Government's health programme for 2000 AD:

100-125% Custom duty on imported raw material; 13% Excise duty; 12% Surcharges; 4% Sales tax (State); 4% C.S.T.; 1-2% Octroi etc.

• "Added to this there are direct and indirect taxes on bottles, caps, aluminium foils, packaging material, etc. We fail to understand the rationale behind government policy when the duty concession could be granted to such items like nylon, electronic goods, paper industry, etc. why the Government is reluctant to exempt/reduce the medicines from taxes.

Thefts and pilferages at the docks

"As it is a national and humanitarian cause it is imperative on the part of the port trust authorities and others concerned and busi-

community to unite together to put an end to the antinational and antihuman activities of pilferage and theft of medicines at the borders and save the country's precious foreign exchange and embarrassment in the international market.

Escalation clause in the pricing

Taking into consideration the ever rising cost of imported raw material, packaging material and labour cost, Government (BICP) should consider the actual cost incurred while fixing the price of both bulk drugs and formulations and introduce escalation clause in the event of change of price of these inputs required for the manufacture of final products. This is the only way in our opinion to contain the fluctuation of price and maintain the economic balance in the pharmaceutical industry.

Price Equalisation Account (DPEA)

The Government has done well by abolishing the Equalisation Fund which had lot of present operational anomalies and difficulties. But the Government is still bent on to pursue the recovery of 'unintended profits' by the companies. However, we would suggest the Government to set aside this recovery attempt as it is an established fact that the companies particularly of the national sector do not accumulate any unintended profits.

Irregularities of supply of raw material by the Government agencies

It is unfortunate to note that there are a lot of irregularities in the supply of bulk drug raw material by the Government agencies like IDPL, etc. Even after registering the contracts in advance, at the required time the vital materials like Tetracycline, Vitamin B1, Vitamin B2, etc. are not available as per the allocation orders issued by the agencies. SSI units cannot afford to pay higher price and lift raw material from the open market. On account of this the production programme of manufacturers is badly affected incurring financial losses to these companies.

Conclusion

When we have a closer look at the new pricing policy, we are rather shocked to note that the national sector particularly SSI units has not been given the necessary preferential treatment which is the need of the hour when the Indian Sector is surging ahead taking up challenges in all fronts of growth and development of the pharmaceutical industry. Too many controls on the other hand tend to retard the growth of the pharmaceutical industry. We would therefore be looking forward to

the authorities concerned to minimise unnecessary controls without compromising on quality consciousness among the manufacturers.

MR VENGAL RAO'S SPEECH

Mr. J. Vengal Rao, Union Industry Minister, in his speech (read out by Mr. Mathur) urged the Indian drug manufacturers to rise up to the occasion to ensure health for all by the year 2000 AD. He said:

"You are also aware that this objective can be achieved only when our pharmaceutical sector is geared to produce medicines required by the year 2000 AD. By then, it is estimated that India is going to be a nation of 960 million people. According to one estimate, we will need drugs worth about Rs. 15,000 (fifteen thousand) crores by 2000 AD. The quantum of production will have to increase roughly by 700% from its present level. Therefore, I would appeal to the members of IDMA to fully equip themselves to meet this challenge. On the part of the Government, we have already announced a new set of measures keeping in view the importance of this sector. Procedures for industrial approvals have been liberalised.

"Delicensing facilities have been provided for a large number of drugs and introduction of many new drugs in the country. Span of price control has been reduced and restricted to only most essential and mass consumption drugs. Return on investments in pharmaceutical sector with the new D.P.C.O. have been made comparable to any other sector of industry and for channelising investments in desired areas.

"One of the main aspects which should not be lost sight of, in the process of the development and growth of industry, is indigenous R&D effort. You all know that quite a bit of technology in the pharmaceutical sector in India today has been imported from some source or the other.

"Though we have modified the technologies as per our own requirements and conditions, the fact remains that greater reliance has been placed on import of technology. Given the size of the Indian industry and its turnover, the investment in research and development and the results achieved so far are not very encouraging. The expenditure which we put in research and development is around 2% of the total turnover whereas in advanced countries it is more than 9%. India with the third biggest scientific and technical force in the world has the capability of developing efficient processes and new technologies which are unique in them and which are not hitherto available in the country.

"There is a great need for maximum indigenisation and establishing most effective backward and forward linkages with the rest of the economy. R & D centres of various pharmaceutical companies should not only supplement the effort of the National Laboratories but they should take a lead in producing specific R & D. Upgradation and modernisation of acquired technologies should also proceed simultaneously and regularly so that the obsolescence rate is reduced.

"Simultaneous with the increased level of production, the industry will have to achieve highest standards of quality. Even otherwise, when we deal with human health there cannot be two qualities. It has to be only one and the best. The new policy measures, lay greater emphasis on achieving and maintaining higher quality standards in drug production and adherence to good manufacturing practices. Government has already taken steps to give statutory support to its intentions in this matter. I am sure, the industry in all its responsiveness will appreciate the spirit behind these measures and act with responsibility. Voluntary organizations are also playing their part effectively in creating quality awareness and in putting constructive suggestions before the Government. I have no doubt in my mind that the Indian drug industry will follow strict ethical code and make a mark in the international field.

"Our performance in exports of drugs and pharmaceuticals has been more than satisfactory in the last 4-5 years. This sector has been giving net trade surplus. But last year the position changed slightly, in spite of increased level of exports over the preceding year. There is no cause for alarm but this sector with all its potential must perform much better on the export front. You may kindly consider setting up of a working group in IDMA to regularly deliberate the design strategies for increasing exports. Our prices are by far the lowest not only in comparison with those of advanced countries but also of developing and under developed countries.

"For promotion of export, number of incentives have been provided, of which you are aware. Government has also given total flexibility for manufacture of any item within the existing facilities without any industrial approval."

MR. H.K. KHAN'S ADDRESS

In his speech Mr. H.K. Khan, Secretary, Department of Chemicals & Petrochemicals, said (in part):

"The drug or pharmaceutical industry as we now prefer to call it, is perhaps the most

sensitive sector of industry in this country as it deals with the most vital aspect of human life viz. the very life and happiness of people. There are various segments of our population who are vitally interested in this industry. The industry itself is divided into so called multi-nationals, the indigenous industry, large, medium and small scale sectors, then the chemists and druggists who reach the medicines to the people, doctors who prescribe and administer the medicines and most important the consumers or the large masses of this country for whose well being this entire exercise is undertaken. Therefore, any measures dealing with this industry have to be undertaken with great circumspection. The first attempt at preparing a comprehensive drug policy was made with the appointment of the Hathi Committee which culminated in the Drug Policy 1979, since then the industry has grown probably more rapidly than any other sector of our economy. Naturally Government had to take a new look at the contents of this policy with the passage of time and with the rapid development of the industry. I am happy to say that inspite of numerous problems Government announced a new series of measures in December, 1986 to streamline the industry and to make it subserve the interests of the consumers. While analyzing the working of the policy it was noticed that the mark-ups under the old policy had become restrictive and were not generating investments into the production of essential drugs. Government, therefore, decided to issue a new DPCO. It did not, however, want to fall into the mistake of announcing a DPCO which would not balance the interests of all concerned.

"We, therefore, appointed a committee under Dr. Vijay Kelkar consisting of experts from various walks of life; the Committee did a commendable job and produced a report which is the basis of the new DPCO. There is no doubt that inspite of the fact that Committee took a long time over its deliberations and consulted every group of persons likely to be interested in the working of the Order, there may have been certain omissions and certain matters may have been overlooked, therefore, Government decided to prolong the life of the Committee so that it could go into the representations received regarding the medicines included or excluded in the new DPCO. The committee will send its recommendations to Government and based on these recommendations, Government will decide whether any changes are to be made in the schedules of the DPCO. However, the DPCO remains operational. I stress this because very often an opinion is voiced that the new DPCO is not operational because of certain problems regarding trade margins, representations from industry etc. It is true that

there is a dispute regarding the trade margins. I expect that modification in the trade margins will be announced very shortly. However, as of now the total trade margin is known to all Companies and implementation of the DPCO is not held up for any reason whatsoever. However, the working of the DPCO means that every unit not exempted from the price control mechanism has to apply for revision of prices and it is on this application that the Department will issue price revisions. A number of applications have been received and revisions have been made and as we claim, quite speedily. Some of these revisions have naturally evolved price increases, some may have even led to decrease in prices.

"However, the DPCO though it is an important feature of the new series of measures is only a part of that set of measures. The objectives of the measures are clearly spelt out. The pharmaceutical industry is a vital part of our economy and therefore a new thrust, a new direction was necessary to make it serve purposes viz. to reach the goal of health for all by the end of the Century. This is not an empty slogan as is obvious from the statistics. The last five years have witnessed a growth of the industry from the production level of Rs. 1,600 crores in 1982-83 in formulations to a level of about Rs. 2,200 crores today. There has, therefore, been adequate development to justify the optimism that the goals we have set for 2000 A.D. will be fulfilled. However, it was necessary that this progress should be given a great impetus. It was also necessary that the growth should be more balanced viz. production should increase in the more essential medicines. In the interests of the country's economy, a thrust towards exports was essential and most of all in the interest of the consumers, Government had to see that proper standards of quality were maintained.

"It has been said that the new measures favour the industry. We have to admit that if our population is not to be starved of medicines, a congenial climate for the growth of the industry has to be created. We have attempted to create that climate by reducing the span of control by increasing the mark-ups on the price controlled medicines and by trying to evolve systems and procedures to give speedy decisions on the representations of the industry. As you know, a Committee on Norms will shortly be finalizing its recommendations which we hope to announce before the middle of the year. We are also working with the BICP to evolve a system by which every application for adjustment of prices can be decided within the prescribed parameters within 30 days. It is true that in the past such applications have taken a long time to finalize. But with the new procedure, I can assure you that decisions will be taken within a time

bound period. As you know, sometimes controls may change but controllers may remain the same. What we are attempting today not only to revise the controls but also make controllers more result oriented. I am sure the industry will benefit by these measures. We have paid special attention to the small scale sector and have taken the bold step to free the small scale sector from all price controls. I hope that the small scale sector will benefit from this liberalization and will play an important role in the development of the industry.

"The state of our country's economy requires that we should reduce our imports and increase exports. One of the greatest problems is that sometimes the duty structure benefits those who import bulk drugs rather than those who import intermediates. Government is having a fresh look at rationalizing this structure. But we cannot make any announcements as the Budget is now due. We also intend to implement phased manufacturing programme so that gradually manufacturing units will go basic thus reducing dependence on imports. One of the most heartening features of the recent times has been to increase in exports. It is indeed with a sense of gratification that we can announce that many drug companies in India have been recognized by the Federal Drug Administration of the U.S.A. and we will now be in a position to export to every corner of the world. With a strong indigenous industry and with enterprising entrepreneurs I believe that our share of the export market will increase very rapidly in the next few years. The Department is also considering to introduce in the drug industry the concept of export oriented industries viz. any industry who applies to Government with an export programme will be placed on this list and all clearances will be given on a special basis to such industries. The condition will be that the industry will have to achieve these targets every year.

"This system I believe, will help in boosting our exports. People very often try to compare our drug policies with those of other developing nations. However, few realise that India is today probably one of the very few developing countries which has a strong indigenous base for manufacture of basic drugs. We cannot, therefore, compare our conditions with those countries where the drug industry is essentially engaged in formulating imported drugs. This factor was recognized at the recent conference in Madrid. In fact, we were very happy that developing countries recognized India's role and many of them have already approached us for assistance to develop their local industry. We are committed to this task. Discussions have already started with many such countries.

As you know, the DPCO has also recognised the role of wholesalers and retailers in bringing medicines to the people. There has been criticism of Government in giving higher margins to them. However, you will appreciate that it is in the interests of the consumers that retailers should employ qualified pharmacists. One of the objectives of the Government in giving them higher margins is to help them in employing qualified pharmacists, while, of course, recognizing that their costs have also increased. Finally, no policy can succeed unless it serves the interests of the consumer. We are a vast country with a vast population and, therefore, we have looked towards production in large quantities and to a distribution network which will reach these medicines to every corner of our country. It is also essential that we reach medicines of the best quality to every section of the population and for that purpose the new

measures have included provisions for quality control, proper labelling etc. Even the DPCO has been so designed as to increase production of essential medicines. Ultimately we believe that increased availability will lead to decrease in prices. With all its problems, the Indian pharmaceutical industry has played a great role in the development of our economy. Throughout the exercise of evolving a new series of measures and of their implementation the industry has cooperated with the Department and it is as a result of this cooperation that we have been able to announce and implement the measures. I do hope that this cooperation will continue. On behalf of the Department I can only assure you that while no doubt occasionally there may be problems, we may not always act in the manner you desire but that the Department is genuinely committed to speedy implementation of the measures in the inter-

ests of the revitalizing the industry. We intend that the new series of measures should not only remain on paper but a new spirit of implementation should prevail which I hope you will experience. On the other hand, we are committed to interests of the consumers and so is the industry and there should be no let up in our efforts to benefit them.

"Shri Modi, the retiring President, has no doubt by his constant appearances in Delhi and by frequent telephone calls been raising various points which are of concern to the industry. However, as President, he has acted as a link between the Government and the industry. I congratulate him on this. I also welcome the new President who has been a champion of the small-scale sector and who will I hope continue the role played by past Presidents in forging strong links between the Government and industry."

KAPL receives IDMA 'TROPHY' Award

Karnataka Antibiotics and Pharmaceuticals Limited (KAPL), a Bangalore-based Central Public Sector Company, has been selected by the expert and independent panel of judges of the Indian Drug Manufacturer's Association (IDMA) for being given the prestigious "TROPHY" award for Quality Excellence for the year 1987 in the category of turnover of Rs. 10 crores and above. The award was given by Mr. H.K. Khan, Secretary, Department of Chemicals and Petrochemicals at the annual function of IDMA on 2nd February 1988 at Bombay. The award was received, on behalf of the company, by its Managing Director Incharge, Shri P.P. Madappa.

KAPL has been adjudged winners amongst the applicants from all over India. There are about 35 eligible Indian pharmaceutical companies in this category. This is the first time that any Public Sector Undertaking has been selected for the prestigious "Trophy".

KAPL has also the distinction of having won four awards/certificates within a duration of the last 12 months:

1) IDMA Merit Certificate for Quality Excellence for the year 1986 in the DGTD Sector in February 1987.

2) AMCO Shield Award for Excellence for Harmonious Employer-Employee Relationship for 1986 - in June 1987.

3) Bureau of Public Enterprises, Government of India, award for "Excellence in Performance" for the year 1985-86, presented by

the Hon'ble Prime Minister in January 1988.

4) And now, in February 1988, the IDMA Quality Excellence "Trophy" for 1987.

Latest concepts have been in-built into the design of the facilities including surroundings. The facilities include innovative concepts like modular design, mezzanine concept, hygienic class levels, differential pressure concept, etc. with an aim to completely avoid product contamination and to implement strict measures of Good Manufacturing Practices (GMP) and Good Laboratory Practices. Sophisticated technology, especially in Parenteral Field has been developed.

The company has adopted systematic and elaborate validation procedures before commencing commercial production and has a system for periodic evaluation. This has resulted in achieving 'Zero' batch rejections so far.

The facilities and practices were recently approved by the Swedish Health Board Authorities as to be on par with international standards. The company has been maintaining the Good Manufacturing Practices, in spite of phenomenal growth the company has achieved.

Products of the company are being marketed through an all India net work with a debut to export market. The company's selling points have always been the Quality of its products and customer service. The overall excellence in Corporate performance of the

company is clear from the fact that the four awards were given out to the company.

The company could achieve the above distinction through committed and motivated employees and by meticulously implementing the well conceived corporate plans, policies and management systems.

The company has been a shining example of a dynamic, professional and a committed Public Sector, striving for a high growth rate and profitability through excellence in Quality, Productivity, Industrial Relations and Customer Service.

The main factors for the success story have been:

- Highly motivated and dedicated employees;
- progressive, committed and continued leadership;
- pursuance of excellence in productivity and quality;
- harmonious industrial relations;
- customer oriented and aggressive marketing;
- efficient financial and material management;
- carefully selected and competently trained employees;
- decentralised, democratic and participative management;
- continuous upgradation of facilities and inputs;
- professionally qualified and highly competent Board; and
- support of State and Central Governments.

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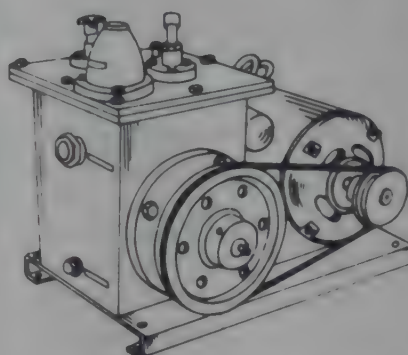
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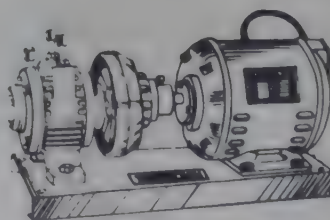
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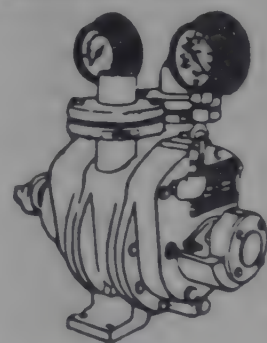
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SPOTLIGHT ON

Biotechnology & Life Sciences (Part 2)

**DRUG-DELIVERY SYSTEM
BASED ON HYALURONIC ACID
UNDER DEVELOPMENT**

Genzyme (Boston, Mass) in collaboration with Hoffmann-La Roche has begun a Research & Development programme to develop hyaluronic acid as a drug-delivery vehicle. The objective of this project is to produce hyaluronic acid-based products in dosage form for injectable formulations for Roche's biologically active proteins.

Under the agreement, Genzyme will manufacture therapeutic grade hyaluronic acid for Roche to conduct controlled studies with the product for drug delivery.

The market potential for hyaluronic acid as a drug delivery system could be extremely large, reports Henri Termeer, President of Genzyme. Further, hyaluronic acid could increase the usefulness of genetically engineered proteins in fighting disease. Genzyme currently has five hyaluronic acid derivatives in areas including ophthalmic, orthopaedic and surgical implants. Products in these areas could be in the market by the end of 1988. Genzyme also had earlier finalized agreement with another company Howmedica (a Stryker subsidiary) to develop hyaluronic acid-based products for orthopaedic applications. (*ECN*, 7/13/87 p.12)

**FAST-GROWING SALMON FROM
GROWTH HORMONE FOR FISH
FARMS ON THE HORIZON**

Fish lovers may buy in future genetically engineered salmon, if searches in Ireland succeed. Joe

Sreeman, researchers at the Agricultural Institute at Galway (Ireland) is endeavouring to produce 'transgenic' salmon, which carry a foreign gene. The Irish researchers have injected 4000 salmon eggs with copies of a gene for growth hormone in the hope of enhancing the productivity of local fish farms.

Alongside the growth hormone gene, the researchers inserted another gene, for beta-galactosidase, to act as a marker. They have found signs that this foreign gene was active in the young fry. So it looks as though the genes injected into the eggs did incorporate into the chromosomes. The salmon from injected eggs are now almost a year old, so the researchers will know soon whether the genetic engineering has made the fish grow faster. (*New Sci.* 9/17/87 p. 42)

**TWO JAPANESE COMPANIES TO
JOINTLY DEVELOP G-CSF
(GRANULOCYTE COLONY
FORMING STIMULATING
FACTOR)**

Kirin Brewery Co. and Sankyo Co., both of Japan, have finalized collaboration to jointly develop Granulocyte Colony Forming Stimulating Factor (G-CSF). This is now under development by Kirin Brewery and Sankyo will be in charge of marketing the product. This business tie-up follows the earlier tie-up for erythropoietin (EPO).

Kirin Brewery and US Venture business, Amgen, jointly established in 1984, Kirin Amgen and have hitherto tackled R & D for EPO and G-CSF. Incidentally, EPO is produced through gene recombination in the cells of the Chinese hamster's

ovary. It was put into clinical tests last year.

The targeted G-CSF is produced via genetic recombination of *E. coli*, which is used as a host. Amgen and Kirin Brewery inaugurated clinical trials on the products.

G-CSF serves to propagate granulocytes classified as leucocytes. It is expected to cure leukopenia and improve immunocompetence against infectious diseases. When cancer patients take anti cancer drugs and undergo radiotherapy, they suffer from a decline in the number of their leucocytes, which play a key role in their immune system. As a result they invariably catch infectious diseases and die.

In Japan, Chugai Pharmaceutical Co have been continuing clinical tests on G-CSF since May 1986. Combined use of the product and anti cancer drugs, has attracted much attention throughout the world among cancer researchers. (*Japan Chem. Wk.*, 11/5/87 p.4)

**RICE BIOTECHNOLOGY MAKES
GOOD PROGRESS IN JAPAN**

Rice biotechnology has made phenomenal progress in Japan in recent years. Building on successes in growing rice from protoplasts (*Nature* 321, 639 (1986)), Dr. K. Shimamoto of Plantech Research Institute has succeeded in growing 250 hybrid plants created by electro-fusion of protoplasts of cultivated and wild rice. All have grown to maturity and some have started to flower. This development will give rise to the virtually untapped genetic variability in the ten species of wild rice.

Cell-fusion technology is also aiding the production of sake and orchids are being propagated using tissue culture. The Ministry of Agriculture, Forestry & Fisheries is also showing keen interest in rice biotechnology and \$500,000 has been allocated for a feasibility study for full sequencing of the chromosomal DNA of rice. But the Ministry sees many technical difficulties ahead and may favour a simpler mapping project. The Ministry has already paid up \$2 million to the USA for the genomic map of the tomato plant and this will be used with conventional technology to create new nutritious tomatoes.

Japan already has more than 100 biotech promotion centres and biotech companies are establishing links with them and with agricultural cooperatives to disseminate knowledge. (*Nature*, 10/22/87, p. 661)

A VITAMIN C PRECURSOR MADE VIA IN-VITRO BIOSYNTHESIS

Researchers at Genentech Inc (USA) working under S. Anderson have reported the laboratory scale production of Vit C precursor, namely 2-Keto-L-gulonate (2-KLG) by a genetically modified *Erwinia herbicola*. Normally, during fermentation, *Erwinia* Sp. oxidizes the hexose D-gulose to 2,5-diketo-D-gulonic acid (2,5 DKG), which is then reduced to 2-KLG by *Corynebacterium*-Sp. The new method allows this synthesis to proceed in a single step using *Erwinia herbicola*, which expresses *Corynebacterium* Sp. 2,5 DKG reductase.

The in-vivo preparation proceeds by the oxidation of gulose to

2,5-DKG by three inner-membrane bound enzymes followed by transport into the cell interior where enzymatic reduction occurs. The resulting 2-KLG then diffuses through the inner and outer membranes of *E. herbicola* to the nutrient medium. (*Science*, 1985, 230, 144), (*Chemtech*, 9/1987, p.5, 9).

THE EPA APPROVES FIELD TEST FOR FLUORESCENT BACTERIA IN USA.

The USA's Environmental Protection Agency (EPA) approved last October the first field test of a recombinant organism to fall under the Toxic Substance Control Act (TSCA). This approval has cleared the way for Monsanto to field test a strain of fluorescent *Pseudomonas aureofaciens* containing lacZY marker genes that will allow the strain to be tracked in the environment. Monsanto plans to introduce genes for agriculturally beneficial proteins into the strain, and the marker genes will be used to access the movement of the engineered bacteria.

Most recombinant organisms are expected to be regulated under TSCA, in future. Monsanto's field test is expected to begin in November in 1987, in Blackville, South Carolina. (*Nature*, 9/29/87, p. 757)

A NEW MULTIPLE-ZONE ANAEROBIC PROCESS FOR PRODUCING FUEL-GRADE METHANE UNVEILED

A novel multiple-zone anaerobic process for producing fuel-grade methane from the concentrated wastewater of organic chemical,

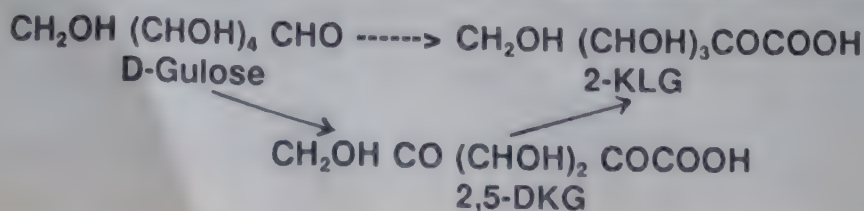
pharmaceutical, food processing and pulp and paper plants was recently unveiled by Zimpro/Passavant (Wisconsin). Called Multizone, the route combines both suspended growth and fixed film treatment zones in a single vessel. This reduces biomass loss, a problem common to other methods, and also eliminates plugging of the filter media by solids, the firm claims.

Multizone cuts organic pollutant concentrations by 90% or more, uses less than 25% of the electric power needed by aerobic route. Enough methane — which can be used to generate steam or drive plant equipment — is generated to pay for the system in 4 months or less. (*Chem. Eng.*, 11/9/87, p. 9).

LIPASE ENZYME LINKED TO INORGANIC FERRITE — A NEW LANDMARK IN ENZYMOLOGY

Enzymes have been successfully modified by polyethylene glycol, but they are disposed off after having been used only once. So researcher Dr. Yuji Inada at the Tokyo Institute of Technology was wondering whether the enzymes can be recovered. Therefore Dr. Inada hit upon the idea of magnetizing enzymes. The researchers synthesized an enzyme with polyethylene glycol and placed it in the centre surrounded by inorganic ferrite material. The ferrite material was linked with the enzyme complex. According to Dr. Inada, combining polyethylene glycol and magnetic ferrite, a carboxyl group works better than a hydroxyl group.

The complex of ferrite, polyethylene glycol and lipase appears to exist completely in a colloidal state when put in an organic solution and will adhere to a magnet completely in about 5 mins. When the magnet is removed, the lipase will retrieve its activity. This magnetic property of the enzyme is a new landmark



ymology. This magnetic property may lead to easy recovery and easier separation of the enzyme. It is also possible for concentrated administration of drugs on the affected part. Therefore, researchers expect a great potential for the magnetic enzyme in medical research, particularly in the field of hybrid protein research. (*Japan Chem. Wk.*, 3/5/87, p. 3).

BUTANOL OBTAINED DIRECTLY FROM CELLULOSE.

The classic fermentation to produce butanol has now fallen prey to DNA technology. By combining the DNA of cellulose decomposing bacterium *Clostridium thermosaccharophilum* with the butyric acid/butanol producing bacterium, *C. thermosaccharophilum*, the researchers in Japan have produced a bacterium with the ability to decompose cellulose and produce butanol directly. The batch process, however, is slow even at 60 degree C. (*Chemtech*, 2/1987, p. 19).

THE WORLD'S FIRST-EVER GENETICALLY ENGINEERED HUMAN VACCINE MAKES A DEBUT IN USA.

Merck Sharpe & Dohme (USA) has marketed in early 1987, the world's first genetically-engineered human vaccine under the trade name Rcombivax HB in USA for use in preventing Hepatitis-B infection and for breaking the cycle of infection from carrier mothers with chronic Hepatitis-B infections.

Manufactured with r-DNA technology to produce hepatitis-B antigen from a genetically engineered form of baker's yeast, the vaccine circumvent dependence on human plasma as a source of hepatitis-B vaccine antigen needed to create the vaccine Heptavax B in use since 1982. The vaccine induced protec-

tive levels of antibodies against Hepatitis-B virus infection in 90% of subjects. In infants born to mothers chronically infected with the virus, 94% efficacy was seen when they were administered a single dose of hepatitis-B immune globulin at birth, followed by the recommended three doses of the new vaccine.

During the clinical trials, no serious adverse reactions were reported although subjects complained of fatigue, headache, fever, nausea and local reactions at the injection site, including soreness, itching and swelling. (*Am. Pharmacy*, 6/1987, p. 26).

MATERNAL AND PATERNAL GENES DISTINGUISHED

Geneticists have known for some time that at least for some mammals, a developing embryo can distinguish whether a particular gene comes to it from its father or its mother. The gene is said to carry an imprint — a distinguishing trait of some sort — that marks which parent it came from. Now a group of researchers from the Department of Molecular Embryology at Cambridge University in England and another group from Ludvig Institute for Cancer Research in Montreal and Mount Sinai Hospital Research Institute in Toronto independently propose that the imprinting occurs through the degree of methylation of the DNA as it is inherited from the parent.

Both groups used the same experimental strategy. They inserted extraneous but easily recognized pieces of DNA into the gametes of mice and observed the inheritance of this DNA through several generations. Four of five gene segments studied by the Canadians and one of seven studied by the English group showed significant differences in the degree of methylation of the DNA, depending on which parent

the gene segment was inherited from. In both studies, a son who inherited the gene from his mother passed it on in the male form to his offspring, whereas a daughter passed it on in the female form. (*C & EN*, 7/27/87, p. 24); (*Nature*, 328, 203, 246, 249, (1980))

JAPAN MARKETS SYNTHETIC BIOTECH DETERGENT

Kao Corp (Japan) has marketed in 1987, a new biotech detergent under its trade name 'Attack' for clothing. This new detergent contains biotechnology applied cleaning ingredients dubbed 'Biotex', which can remove traces of stains. It exhibits its strong cleaning power even when used at the rate of one-fourth that of conventional products, since the detergent particles are reported to be compact.

The component 'Biotex' is alkaline cellulase produced by an aerobic bacillus. It shows characteristic activity even under alkaline condition. The Biotex was produced by the company's proprietary biotech techniques. Biotex directly acts on each fibre and helps remove ultrafine (0.2 micron) stains from the gaps between them. Conventional detergents cannot remove these stains, which result in yellowing or blackening of clothing. It Attack, the company has made particles compact by a new technology of coating detergent particles with anti-caking agents and thereby accelerating their solution in water. Conventional detergent particles are hollow so that they can easily dissolve in water.

This new detergent will meet the consumers demand for a compact detergent. It is expected to have a great impact on the domestic detergent market in Japan, which has not achieved any significant technical breakthrough in recent years. (*Jap. Chem. Wk.* 4/9/87, p.5).

(Continued on p. 87)

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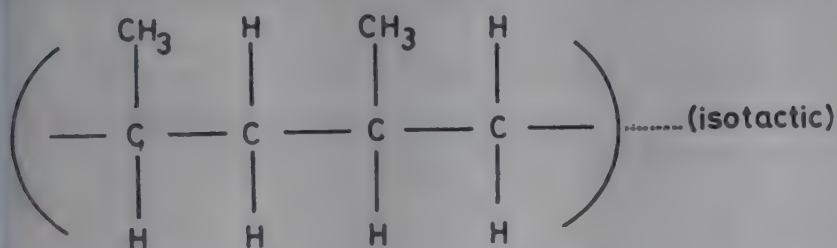
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Ultra-Violet Light Stabilisation of Polypropylene

Dr. B.O. SHAH
Neomer - A Div. of A.C.W., Baroda

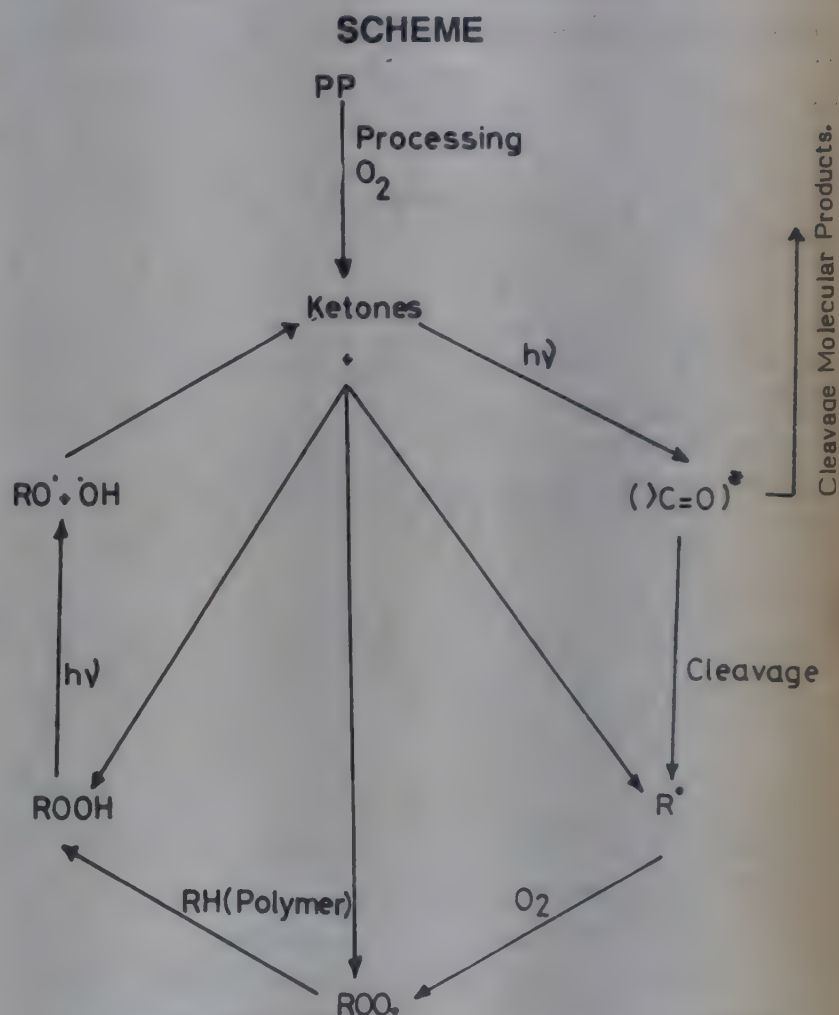
Polyolefins are markedly susceptible to oxidative deterioration when exposed to sunlight. Susceptibility of unstabilized resins to visible physical effects such as loss of gloss, discoloration, surface cracking, embrittlement or deterioration of mechanical and electrical properties under weathering conditions increases in the sequence: low density polyethylene (LDPE) high density polyethylene (HDPE) polypropylene (PP). This sensitivity of polyolefins to weathering has restricted their use in outdoor applications. However the last four decades have seen the development of some highly effective U.V. light stabilizers which can delay the onset of polyolefin embrittlement. The current literature in this area indicates that interest in developing more cost-effective additives to protect polyolefins is unabated.

Polypropylene (I) has found extensive commercial use in films and fibers despite its greater susceptibility than other olefins to oxidative photodegradation. This lower photooxidative stability is generally attributed to the presence of a labile hydrogen on the tertiary carbon atom in each repeating unit of PP. Pure polypropylene



is transparent in the U.V. region (290-400 nm). However, the catalysts impurities (eg., Ti and Al), structural irregularities including double bond formation and branching introduced during the manufacturing process, thermal oxidation products while processing and storage, and absorbed polynuclear aromatics (PNA) are major effective chromophores (ch) absorbing U.V. radiation above 300 nm and promote photodegradation of PP through numerous photochemical reactions. The potential chromophores in commercial PP are peroxides and hydroperoxides (-OOH), carbonyl compounds (C=O), catalyst residues (as Ti), and charge transfer complexes (PP....O₂). Following is the schematic

presentation of the role of these species in the PP matrix on exposure to U.V. radiation.



The above scheme shows vitious photo-oxidation and deterioration of polymer (PP) chains through various photo-oxidative intermediate species.

Thus for U.V. stabilisation of PP, and olefins in general, it is required (i) to absorb U.V. radiation, (ii) to quench the energy of excited species, (iii) to decompose hydroperoxide, (iv) to scavenge reactive radicals and (v) to complex metals; and it is accomplished by one or more members of a group of compounds known as U.V. stabilisers.

The U.V. stabiliser initially reduces the amount of energy absorbed by the chromophores present in the polymer matrix. The effectiveness of the U.V. stabiliser, designed for a colorless system, is restricted by the finite upper limit of the extinction coefficient, so that large concentrations (0.5-2 wt %) are needed to protect thin

* A paper presented at the Seminar on 'Role of Ultra-Violet Stabilizer In Polymers' organised by Transpek Industry Ltd.

(~25 μ m) substrates. PP is notch sensitive, so that surface oxidation with surface crack formation is especially effective in causing embrittlement thus limiting the effectiveness of U.V. absorbers.

To gain maximum protection by U.V. absorption effects, the stabiliser additives or its rearrangement product must be capable of harmlessly dissipating the huge quantity of absorbed energy without being destroyed itself and without sensitising the oxidation of the host polyolefin. Many of the organic U.V. stabilisers developed on the basis of the U.V. absorption concept contain intramolecularly hydrogen-bonded phenolic -OH groups (2-hydroxybenzophenones, 2'-hydroxy-2-phenyl benzotriazoles, etc.) or rearrange to this type of product (phenyl 4'-hydroxybenzoates, resorcinol monobenzoate, etc.).

The stabilising effect of this -OH group has been suggested to result from a keto-enol tautomerisation but recently Klopffer has suggested a series of steps involving quinone formation, with proton transfer acting as a switching mechanism between excited states, radiationless transitions being key steps in deactivation.

The excitation of chromophores in PP produces excited states which can then take part in reactions (cleavage, hydrogen abstraction) and so initiate oxidation degradation of PP. The importance of carbonyl chromophores in PP photo-oxidation is much less than previously suggested. Peroxides and hydroperoxides photolyze extremely readily to give free radicals and hence quenching of this photolysis is impossible. The generation of singlet oxygen and aromatic ketones from PNA impurities within PP films could be prevented by deactivation of PNA excited states using nickel ketoximes.

The optimum way to reduce the contribution of peroxides to photodegradation is to remove peroxides by a rapid dark reaction. Several of the nickel chelates are able to decompose peroxides in PP films; the diffusion process is the mechanism. Proven hydroperoxide decomposing chelates for PP include Ni(II) bis (dialkylcarbamates) and Ni(II) bis (dialkyldithiophosphates), especially when used in conjunction with a 2-hydroxybenzophenone. Zn(II) bis (diethyldithiocarbamate) has been reported to slow a powerful synergistic effect on the U.V. protection of PP when combined at 1 wt % with zinc oxide (2 wt %).

Ti catalyst residues initiating photodegradation of PP can be reduced by the addition of a suitable complexing agent. Some U.V. stabilisers are able to complex

with Ti species, for example, various oximes form complex with Ti halides. Bis-phenols, phosphites and epoxides effectively deactivate the transition metals in PP.

The scavenging of reactive radicals to give nonreactive photostable products will obviously contribute to U.V. protection. Substituted phenols are relatively U.V. stable and can persist long enough to scavenge peroxide radicals. 2-hydroxybenzophenones under conditions of intramolecular hydrogen bonding are reported to become free radical scavengers; 2-hydroxyoctyloxybenzophenone acts as a radical scavenger to retard oxidation even under processing conditions.

Evaluation and Choice of Stabilizers

Evaluation:

The testing of the efficiency of light stabilisers in given substrate is performed in laboratory trials and by outdoor exposure. Compared to outdoor weathering, artificial weathering offers the advantages of shorter testing time and of independence from site, season and local climate. In testing the U.V. stability of plastics materials, different characteristics are considered. They are optical and mechanical properties. It is noted that acceleration is not equivalent to correlation with a particular natural weathering exposure. Further, accelerated testing problems arise from changes in the order in light intensity of the photo-oxidation process for different U.V. stabiliser mechanisms. Thus the acceleration factor varies from one stabilised sample to another. Nonetheless indoor weathering tests continue to develop use of data within the limitation of their individual capacities in comparing the effectiveness of stabilisers.

Choices:

After understanding the efficiency of an individual stabiliser, one should know the effect of combination of two or more stabilisers. This is known as synergism in stabilisers. To achieve an excellent protection, it may be necessary to have some combination of stabilisers. Interaction among themselves is very important. Apart from stabilisers predominantly for light, stabilisers for heat are also added. Auxiliary stabilisers and inhibitors are also used. The synergistic formulation for specific end-product is often kept confidential by the manufacturers.

Other factors important are:

- Compatibility of stabilisers with polymer: Stabilisers should get uniformly distributed. It should help in processing of the polymer.

volatility: Loss of stabiliser should not take place by pelletization.

It should be stable at high temperatures of processing. They should not chemically react with other ingredients of the molten polymer.

Economically, one should aim at meeting the required amount of stability for the processing of polymer and for the end use of product. It is not always necessary to go for highest possible stabilisation.

Incorporation of stabilisers to polypropylene resin can be done in several ways. Resin manufacturers themselves can include them prior to pelletization of resin. It can also be included by the users of the resin. They can be applied to the resin pellets by a 'dusting' technique or by a solvent technique before the extrusion of resin. Masterbatches of the pellets can be produced along with the stabilisers and the masterbatches can be used along with the regular resin. The quantities required can vary from 0.001% to as much as 5% based on the weight of polypropylene depending upon the necessity.

(continued from p. 83)

BIOTECHNOLOGY SEEN AS THE MAJOR KEY FOR FUTURE PROGRESS IN AGRICULTURE

The chief scientist and Vice President of Monsanto, Dr. Howard A. Schneider referred to biotechnology as the most powerful and necessary tool for future progress in agriculture and for solving world's food hunger. His remark was stated at the second annual American Society for Microbiology Conference on Biotechnology in San Diego, Calif, USA.

Plant breeding has already provided plants with resistance to major diseases to some insect pests and with enhanced yields. But genetic engineers have the tools to enhance significantly the efficiency of agricultural production and make farming a more reliable and profitable business.

According to Dr. Schneider, biotechnology can enable the American farmers to significantly lower his input costs, improve crop quality and at the same time enhance the quality of the environment. Speaking from the world perspective, Dr. Schneider emphasized that if we cannot use tools like biotechnology

to enhance the agricultural productivity of tropical lands that have already had their forests removed, deforestation will continue with profound consequences for the productivity and health of the plant. In the end, using biotechnology to control plant pests and to raise the agricultural productivity of the areas we have decided to cultivate by what may be the best way to leave other parts of the world unaltered. In this way tropical rain forests and valuable forest wealth of countries round the world could be saved for the health and economic welfare of the future generations.

Besides improving the productivity of agricultural lands, genetic engineers are also learning how to make foods of higher quality, better taste, better storageability, better processability, better brewability and more nutritious. (*CMR*, 7/6/87, pp. 5, 23).

RUSSIAN BIOTECH VENTURE SLATED.

An international consortium, including Sulzer Biotech Systems (Woodbury, N.Y) has won a contract from the Russian Techmasimport to set up new facilities at the Chemya-

kin Biotechnology Institute in Moscow.

The consortium headed by Austrian, Oweg GmbH, is to design and equip research development laboratories and pilot plants for the development and production of plant and animal growth regulators, monoclonal antibodies, low molecular weight proteins and polymers for use in chromatographic separation media. (*CMR*, 7/6/86, p. 9).

A SERINE PROTEASE FROM B. LICHENIFORMIS FOR DETERGENTS

The largest current application of microbial enzymes is the use of proteases in detergents. A serine protease from *B. licheniformis* has been recently isolated. This protease has good stability and activity under the conditions employed in washing, pH 9-10 and 50-60 degree C. It has also good resistance to sequestering agents, surfactants and perborates present in modern detergent formulations. In addition, another advantage is that *B. licheniformis* can be easily grown and produces the protease extracellularly in high yields. (*Enzyme Microb. Technol.*, (1987), Vol. 9, p. 203).

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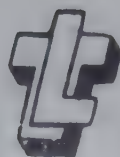
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Chemical News From Abroad

DUPONT PLANS CHLORALKALI PLANT FOR MAYDOWN SITE

Du Pont recently celebrated 50th anniversary of the discovery of nylon, the US chemicals and energy giant detailed some new developments from its \$1.3 bn/year research programme and announced plans to build a pound 20 (\$36 m) chloralkali plant at Maydown, Northern Ireland.

Company Chairman Richard Eckert praised the pioneering scientists who had developed nylon in 1937 and sparked the "materials revolution". He said Du Pont intended to remain in the forefront of materials development, but was less active in the areas of AIDS and cancer research, new crop protection products and in new engineering technology to find and recover

Alexander Mac Lachlan, senior vice President Technology, said Du Pont has a number of products in the pharmaceutical pipeline including new approaches to cancer, some promising antibacterials and antifungals, therapeutics for hypertension, cardiovascular disease and even memory loss associated with Alzheimer's (disease)."

He added that Du Pont is a world leader in developing AIDS blood tests and has a "promising" AIDS drug, *zalcitabine*, in clinical trials in US. Eckert said that Du Pont has a relatively small pharmaceuticals portfolio compared with some other chemicals majors, but he indicated that the company intends to become a "significant force" in the market in the near future. The Chairman said he would not rule out acquisition if the right target was available.

Mac Lachlan mentioned some of Du Pont's developments in the new materials area. For the aerospace market, the company has produced a high performance organic composite *Avimid*, which can withstand temperatures of up to 625 degree F. Work is also in progress on high temperature ceramic composites.

For the automotive sector, Du Pont is developing an entire car door based on a composite frame as well as coatings for finishing steel and plastic parts.

Electronics developments include a new photoresist film which can be directly imaged by laser scanning and "green tape", a flexible ceramics and polymers composite for mounting chips.

In the health sector, Du Pont is adapting its aerospace composites for human joint replacement. It is also working with a joint venture partner to refine balloon catheters that can clear obstructions in heart arteries and has recently introduced the *Genesis 2000* DNA sequencer.

This enables rapid discovery of genetic codes for organisms and has major implications for disease investigation.

The company is also trying to develop a rigid food packaging material that will be as strong as steel, as impermeable and clear as glass, as tough and pliable as plastic and as inexpensive as paper.

For the agricultural sector, Du Pont plans to introduce five new herbicides later this year for soya beans, corn and other cereal crops. The company already has an extensive herbicide range based on the sulfonylureas.

Separately, the company announced it was increasing total investment at Maydown, UK to pound 425 m since 1980 with the construction of a new chloralkali plant. Most of the production will be consumed on site but a small quantity of caustic soda will be available for the merchant market.

Building will begin in late 1988 with startup scheduled for June 1990. The process for converting salt solution to chlorine and caustic soda will use Du Pont's ion exchange technology.

Chlorine from the new plant will be used to make *Neoprene*, chloroprene rubber and *Hypalon*, chlorosulphonated polyethylene. Caustic soda will be used for both *Neoprene* and *Hypalon* and Du Pont's new Kevlar aramid fibre plant due on stream in mid-1988.

ROBINS BATTLE

Although Sanofi's \$600 m bid for drug maker A.H. Robins has won approval from the US Group's Board, it is being vigorously challenged by a committee representing 50% of share holders.

The Committee has endorsed a rival bid from American Home Products, which provides \$700 m, or \$29 per share.

Sanofi has already said it is prepared to raise its bid beyond the original \$600 m. The French Group also says it is determined to win the battle for Robins. A third group, Rorer has bid \$650m.

HIMONT GETS UK SITE

Himont Inc has acquired UK Plastics Compounding Concern Bonar Cole Plastics from Dundee-based Low & Bonar for around pound 5 m (\$9 m). The move gives Himont its

first manufacturing base in the UK and pre-empt the company's search for a greenfield site for a compounds manufacturing facility.

Low & Bonar sold its subsidiary as part of its strategy to focus on niche polymer areas.

Bonar Polymers is building a new 5,000 ton/year acrylic polymers plant at Newton Aycliffe in the north of England which is due for commissioning this spring.

BP AND BAYER SIGN EC TRANSFER

BP Chemicals, Bayer and their joint venture company Erdolchemie have agreed the transfer of the marketing operation for Erdolchemie's polyethylene production from Bayer to BP Chemicals. The agreement makes BP joint number one, with Italy's Enichem, in the EEC lDPE/lIdPE market.

The marketing agreement, which takes effect on March 1, 1988, is subject to final approval from the competition directorate — DGIV — of the European Commission.

SAUDI TITANIUM DIOXIDE PLANT GETS GREEN LIGHT

A long mooted titanium dioxide project in Saudi Arabia has been given the go ahead. Private firm Crystal Pigment Company proposes to build a 45,000 ton/year plant at Yanbu on Saudi Arabia's Red Sea coast to supply markets in the Gulf Area, other Arab Countries and Africa.

The plant will be based on technology supplied by US firm Kerr McGee, which will hold a 25 per cent stake in the venture. A major loan and license agreement for the project — first revealed in 1985 — was approved in Saudi Arabia on

December 30. The Saudi Industrial Development Fund is to lend SR 242 m (\$65 m) towards the \$120 m project. The rest of the funding will be provided from equity participation.

The major shareholders of Crystal Pigment Company — which is about to change its name but retain Crystal Pigment as a trademark — are Saudi Arabia's National Industrialization Company and Kuwait-based Gulf Investment Corporation, with 24% each and the private Saudi concern, Shairco, which, like Kerr McGee, has a 25% stake.

Talal Al-Shair, President of Shairco, says that negotiations for raw material supply to the plant, which will be based on chloride route technology, are still in progress. Bid documents for potential contractors will be issued at the end of this month and Crystal Pigment hopes to finalise engineering contracts two months after that, allowing construction to start in April.

Three companies — Bechtel, which did the feasibility study, Davy McKee and Fluor are being invited to bid. According to Al-Shair, the project will be highly efficient and will benefit from attractive incentives and infrastructure at the Yanbu port location. The market for titanium dioxide in the Gulf area is 15,000 ton/year but for the Middle East as a whole it is 100,000 ton/year.

Titanium dioxide is in very tight supply worldwide and plant operating rates are said to be around 100% in the US and Europe. In the US, where demand last year is thought to have reached 1m.tons, it costs \$2,000/ton to fund a capacity increase, one producer says. However, Du Pont, Kemira and Kerr McGee are all adding capacity there.

Demand for the white pigment is said to be growing at 5-6% year and

at 7-10% in the paper and plastic sectors. As prices outside the have risen by around 20%, exports have increased by so 10% recently.

STERLING ALLEGES ROCHE VIOLATIONS

In a move to defeat the \$4.2 hostile bid launched by Hoffmann-La Roche, Sterling Drug has filed lawsuit against the Swiss major alleging violations of US disclosure laws and insider trading.

In response, Roche said that lawsuit was "entirely without merit" and it was "fully ready to cooperate with the authorities"

Sterling has requested its shareholders to wait until they are advised of the company's position (federal law requires this by end January before deciding to accept or reject the offer.

Sterling has also objected to Roche's choice of the commercial bank, Morgan Guaranty Trust, appointed to advise it on the offer. Morgan Guaranty has had close links with Sterling Drug over a number of years. Sterling chairman John Pietruski has accused the bank of unethical conduct, saying it has been "pry into our most confidential financial information."

So far no white knight has emerged to counter the Roche bid. Jim Callendrillo at US consultant Charles H. Kline believes that other potential bidders are holding fire until the Roche offer expires on February 3, by which time Sterling's share price may have fallen back.

Sterling's core businesses consist of prescription products, over-the-counter drugs, and household and consumer products. Its distinct advantage would be easy for a new owner

off piecemeal. Bayer has been suggested as a likely bidder for Sterling. The US firm owns the Bayer cross symbol and the right to sell Bayer's aspirin in the US, having bought the trademarks in an auction in 1919 after they were confiscated by the US Government as enemy property during the first world war.

In a \$25 m deal with Sterling in 1986, Bayer was awarded the right to use its name, but not the cross, and a number of industrial products and ethical drugs sold in the US. Alternatively, Bayer may attempt to regain the trademark from a new owner.

ICN Pharmaceuticals, a small California based pharmaceuticals firm, has increased its stake in Hoffmann-La Roche from 6.3% to 10%. ICN says it wants to buy a large drugs company to promote its antiviral treatment, Ribavirin.

BP BUYS RIGHTS TO SPANISH DETERGENTS

BP Detergents International (BPDI) has acquired worldwide rights to the Gior brand of detergents from Spanish manufacturer Roig SA, and has taken over the distribution

firm Dismark. Terms of the deal were not disclosed. The move furthers BPDI's restructuring of its business portfolio to focus on supplying consumer markets where profit margins are higher, while pulling out of detergent manufacturing.

BPDI is a leading supplier of private label and unbranded lines for super markets and other large retailers in Europe and has operating companies in the UK, Germany, France, Belgium, Italy, Malaysia and Indonesia. Roig is a leading Spanish manufacturer of liquid low sud textile detergents with a 55% market share. It also claims 12% of the high sud hand wash detergents market in Spain. Its products are distributed under the Gior brandname by Dismark. Sales of Dismark total around Pta 2.5 bn/year (\$22.5 m).

SHELL BOOSTS ADDITIVES

Shell has invested pound 45 m (\$82 m) in the first stages of installing new process technology for the production of oil additives at Stanlow in the UK and at Berre in France. The move forms part of the group's long term strategy to expand its additives business which involves overall expenditure in excess of pound

150 m. Capacity for producing detergent lube oil additives at both sites is now being increased by 30% to reach a total of over 100,000 ton/year. Existing capacity at Stanlow for ashless dispersant production is planned to double over the next three years while a new dispersant manufacturing plant at Berre is planned for start up in 1990.

KIO UPS ERT STAKE

The Kuwait Investment Office (KIO) has increased its stake in Spain's biggest private sector chemical group, ERT, from 25 to 35%. The cost of the 10% stake, equivalent to 4.8 m shares, is estimated at Pta 16.8 bn (\$151.5 m).

KIO's stake in ERT is owned indirectly. Some 20% is owned by Cros, the Barcelona-based chemicals and fertilizer group in which the KIO owns a 52% stake. The remaining 15% is owned by the paper group, Torras Hostench, in which the KIO has a 45% holding.

According to reports, ERT chairman Jose Maria Escondrillas is still trying to buy his company's shares from the KIO but is hampered by a high asking price and ERT's heavy burden of debt.

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Chemical Markets Abroad

LIVELY AROMATICS TRADING IMPROVES SPOT LEVELS

Activity in the aromatics market has proved to be remarkably sprightly during the first two weeks of 1988. Producers and traders alike are expecting a healthy quarter with strong demand reported for most products and prices taking an early turn upwards.

Styrene proved to be the biggest surprise after finishing off 1987 in an unspectacular fashion. Over the last few weeks of the year, spot prices remained stuck at around \$1210-1220/ton for T1 material and \$1270-1280/ton for T2 although at the time, with very limited availability of material in Rotterdam, some observers were predicting a major price hike.

No sooner had the new year begun than demand from Far East derivative producers pushed prices on the U.S. spot market smartly upwards. In response, European traders hoisted spot levels upwards to \$1240-1260/ton for T1 and 1280-1310/ton for T2, but as Far East buyers hunted in vain for product, almost daily price increases were being reported.

Spot levels were being quoted in the range of \$1400-1450/ton for T1 and \$1450-1480/ton for T2, although most traders said they would be confident of achieving prices in excess of \$1500/ton if they could get their hands on product. But with availability in Rotterdam still under 1000 tons, buyers and sellers are likely to remain unsatisfied.

The first styrene contract for the quarter was concluded between BASF and Bayer at the same level

as Q4 at DM2200/ton, but observers are already speculating that later deals will be concluded at higher levels unless there is some respite from escalating spot prices.

Benzene had a slightly shaky start to the year with unspectacular demand and weak crude oil levels promoting a slight dip in prices, but there has been some recent hotting up in the market mainly due to Deutsche Shell which needed several thousand tons of spot material to top up a major shipment to one of its US affiliates. As benzene contract settlements were held at DM435/ton, well below last quarter's levels, spot prices took a turn in the other direction and have now settled out at around \$260-265/ton.

But despite optimism amongst some traders that benzene could be poised to firm further, prices seem unlikely to rise with crude still weak and more than sufficient availability on the spot market.

Although orthoxylene was slow to get moving, trading in paraxylene got off to a flying start with strong demand and tightening supply of spot material sending prices sharply upwards. After remaining lacklustre towards the year end with prices around \$320-330/ton, new year enquiries have sent spot levels up to \$360-380/ton.

Traders are now quoting price ideas closer to \$400/ton but business has yet to be concluded at that level. Recent improvements in orthoxylene demand have firmed spot prices to around \$285-290/ton and with sustained demand for paraxylene this is expected to prompt price increases in virgin grade material. Only toluene has so far disappointed the market with spot

levels scarcely reaching last year levels and predicted demand from the gasoline pool yet to materialise.

Late 1987 spot levels for toluene were close to \$220/ton but so business has yet to be concluded over \$210/ton.

FRENCH CHEMICALS OUTPUT GROWS

Chemical production in France grew 2.6% in volume terms during 1987, according to provisional figures from the trade union group Union des Industries Chimiques (UIC).

Although this level of growth was below the EEC average of 3.2% UIC says that it is better than expected and above the levels of economic growth for both the UK (2%) and France (1.6%).

The production rate of French units generally remained high, growing 2.8% in petrochemicals, 5.5% in plastics and 4.5% in paints. French foreign trade in chemicals grew 5.1% compared with 4.2% for the EEC overall. Imports rose 6% compared with the EEC average of 6.5%. UIC says these figures reflect the European chemical industry's deteriorating trade balance which has resulted from the weak dollar and restricted purchasing power of developing and East European states.

Investments in the chemical industry throughout the EEC rose 5% compared with 3% for France. Most investments were for plant modernisation and productivity improvements.

For 1988, UIC is gloomy, citing recent upheaval in the international financial markets and low dollar as causes for uncertainty. EEC chemicals growth is set at 2% compared with 0.7% for France.

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GOOD YEAR FOR SPANISH PLASTICS

Spanish Plastics Producers enjoyed a good year in 1987, with output rising 7.6%, according to Anaip, the Manufacturers Association. Based on figures for the period January to September, Anaip estimates that production for 1987 will reach 1.7m ton.

Around 400,000 tons of product is expected to have been exported and some 600,000 tons imported. This puts total Spanish consumption at around 1.9m ton/year, equivalent to a per capita consumption of 44kg/year.

Anaip said strong demand from the automotive, household and packaging sectors was mainly responsible for strong growth. According to Anaip President, M. Boix, the Spanish Industry has made good progress in restructuring with firms concentrating on producing a smaller but higher quality range of products, both in the bulk and speciality plastics sectors.

BRIGHT FORECAST FOR MEDICAL PLASTICS

Over 890,000 ton of speciality plastics will be used in medical and service related markets by 1993, predicts US consultant Phillip Townsend Associates. Commodity plastics such as PVC, PP, PE, PS and acrylics will account for a large portion of this usage, a report from the consultant says.

Additionally, it says the stringent requirements expected for medical plastics will increase the demand for high performance polymers and copolymers such as polycarbonate, ABS, nylon and silicone elastomers. A driving force behind this demand is the Aids virus, according to the

report. Public awareness of potential contamination from the virus is set to boost medical disposables to \$8.3 bn by 1992 and the market as a whole is expected to grow at an average of 8%/year.

US AND CANADA POTASH ROW ENDS

The cross-border potash row between Canada and the US has ended. Canadian producers which have been under attack from the US Department of Commerce for allegedly dumping potash below market value in the US since last August will now have to accept new duty levels.

At a top level meeting duties ranging between 9.14 and 85.2% were imposed on Canadian potash into the US. Two producers from New Mexico which also claimed their markets were damaged by imports of cheap Canadian potash sought a 43% duty level. Exports of potash from Canada's state of Saskatchewan satisfy some 80% of US potash demand.

STRONG GROWTH PREDICTED IN OLEFINS MARKET

The demand outlook for olefins over the next seven years is optimistic with a growth rate of 3.9%/year anticipated for ethylene and 4% for propylene according to a data base report by consultant CMAI.

World demand last year amounted to some 50m tons and this figure is expected to increase to 65m tons by 1994. To meet this demand, world capacity for ethylene is slated to rise by 12m tons during the period 1987-1994.

Propylene demand, meanwhile, which is currently running at 25.5m tons is estimated to increase to 34.4m tons by 1994. While only

5.5m tons of new capacity has been announced, the differential will have to come from refinery sources, the report says.

The strongest ethylene derivative growth areas over the next year will be hdPE at an average annual rate of 5% followed by VCM with a yearly average increase of 4.4%. The slowest growing downstream products are expected to be ethylene oxide and ethylene glycol. Propylene derivatives, however, have a better future with 6% growth rate predicted.

Because of the growth in demand for ethylene and the shortage of supply worldwide, the report estimates that ethylene prices in the US will approach 38 cents/pound and 3 cents/pound for ethylene and propylene respectively.

At today's exchange rates this equates to \$837/ton and \$793/ton almost double the levels being traded at the moment. Much of this increase in pricing will occur between 1988 and 1990 as higher margins are required to justify new construction.

DUTCH IMPROVE

The Dutch chemical industry saw sales rise 4% in 1987 to a total of Dfl. 40.8bn (\$22.2bn). Investments reached Dfl. 3.3bn, an increase of 17% on 1986. The Dutch chemical industry association VNCI expects a further rise of 17% in investments during 1988.

VNCI Chairman Dr. Gerard Bresser said that the chemical sector will not grow as fast as last year, projecting sales growth of around 2%.

Much of the industry's investment in 1987 went into modernizing and replacing existing installations while 10% went on environmental measures.

FIBRES DEMAND TO DOUBLE

High performance fibres and fibre products demand will more than double in the next 5 years and constitute a major segment of the man-made fibres industry, according to a study released by US based Business Communications Co. Demand in the US for these fibres, which currently totals some \$468m, is expected to grow at 16.4%/year.

The current sales value for all high performance fibres, including industrial grades of carbon and Kevlar, is around 14,730 tons which will rise to 25,440 tons by 1992, according to BCC.

The study adds, however, that this specialized sector of the market represents less than 1% of total man-made fibre production, a proportion which is unlikely to change substan-

tially over the next 5 years. Production value, however, which is around 4%, is set to climb to 7% by 1992.

CHEYSSON CALLS FOR FREE TRADE

Claude Cheysson, the EEC Commissioner In Charge of relations with developing countries, told the diplomatic press in Paris last week that he believed the West German Government was now in support of a free trade area agreement with the Gulf Corporation Council (GCC).

The prospect of free trade is hotly opposed by the European chemical industry for fear of a flood of duty-free imports from the Middle East, and last November the European Council voted against such a step.

"We should not run the risk of jeopardising all our exports to these countries," Cheysson argued. How-

ever, "I am convinced that the free trade area will come to be and the Germans who have taken over the EEC presidency for the next six months are as convinced of that as we are."

New trade relations between the EEC and the GCC were necessary, Cheysson said because otherwise, the Gulf States would impose duties on EEC imports.

"If there is an oil shortage tomorrow they could make us pay in one way or another for our reticence," the commissioner continued.

According to the Association of Petrochemical Producers in Europe (APPE) there has been no official turnaround in the German Government's attitude to a free trade area and certainly the West German Chemical Industry is still firmly opposed to such a move.

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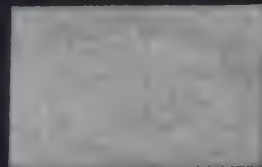
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Plastic Markets Abroad

PLASTICS DEMAND PICKS UP AFTER SLOW START TO YEAR

the world petrochemical market slowly wound down for the Christmas holiday, Europe's plastics producers hoped to take advantage of a lull in demand and bolster stockpiles for the new year.

These expectations however, were soon dashed as deliveries to customers to meet order backlogs continued through the holiday and many producers were unable to replenish their supplies which remained well below the four week mark.

The full impact of December sales is yet to be realised and producers are reluctant to quote definite price increases until they know the extent of their inventories. Activity in the market in early January has been subdued but is expected to heat up in February.

Demand is still good for polyolefins with poor availability prompting price increases across the board. PVC business has also been brisk and prices are poised for a price hike in February, but with demand still strong stocks remain at an unsatisfactorily low level.

PS, however, which has recently been the slow performer in the plastics family, is heading for an improved season and producers aim to have seen the back of the autumn price slide.

Availability of all PE grades has improved with an easing of supply and DSM is understood to be the only company with a plant slated for routine closure this month. But producers still face order backlogs and

most say customers will have to remain on allocation for some time to come. Price increases in the region of 5-10 pfennings are expected to be levied on virtually all hdPE products. Injection and blow moulding grades are running at DM1.75-1.85/ kg with film grade moving between DM1.80-1.85/ kg, although little business has been done and prices are based on speculation rather than confirmed deals.

December rumours of "critically tight" European ldPE supplies which lead to reports of a black market for ldPE are on the wane. Levels are firming to DM1.80-1.85/ kg for January and one producer is preparing to add a further 5 pfennings from February 1. While the PE business has been slow to wake up this year, traders have been focusing their attention on export markets where demand from the Middle East and Africa is currently high. Prices between \$1250-1300/ton fob are "easy to get" according to one trader and numbers as high as \$1400/ton fob have been quoted although some European buyers are sceptical that these levels will be achieved by producers.

There has been a seasonal dip in polypropylene demand over the new year but the underlying trend is still some way above expectations. Producers and traders are talking of a "bullish market" and with low stocks and a demand recovery expected into February and March, prices should harden.

Raffia grade has risen to DM1.85-1.95/ kg with the DM1.80/ kg seen in late December "disappearing fast". Injection moulding and copolymer grades have not moved significantly and in some cases copolymer prices dropped below

DM2.00/ kg before the new year. One producer suggested that with the Q1 propylene price settled DM20/ton down at DM620/ton there would be a slight respite on price increases in 1988.

Demand predictions indicate growth rates between 5-6 %; significantly lower than the level of 10% achieved last year. Producers believe demand in 1988 will slow and by 1989 with most recent capacity announcements on stream, margins could be slim.

PP producers are adopting a wait-and-see approach to price hikes and although official figures have not been stated, increases in the order of 5-10 pfennings will be seen by two producers towards the end of January. Export prices are reported to be "consolidating" with fob prices into China drifting up to \$1340-1350/ton.

Whilst styrene monomer has been hitting the headlines over the past couple of weeks, polystyrene has had a lacklustre start to the year by comparison with initially weak demand and prices steady at pre-Christmas levels.

However, producers are reporting a significant upturn in business mid-month, particularly from the packaging industry and are expecting an upswing in prices, finally marking the end of the continued price erosion in PS seen during the latter half of 1987. Order books for January closed early and only advance orders for February were being accepted.

Crystal grade material is steady at around DM2.35-2.45/ kg with high impact material slightly ahead at DM2.45-2.60/ kg. As business continued to pick up, two major PS producers Dow and BASF announced price hikes of 10 pfennings/kg from

February 1, which is expected to set the trend for other producers.

With the first styrene contract now settled at DM2200/ kg, the same level as Q4, an improvement in the PS business comes as some cheer to independent converters who have seen margins eaten away to "virtually nothing" on the back of rocketing monomer costs. Some producers had been worried that escalating spot prices for styrene buoyed by strong demand from the Far East would be reflected in higher contract levels although some observers predict later settlements could be higher.

With improved demand for polystyrene the market is growing tighter and producers are expecting to see continued price increases during the first half of 1988. Although demand growth is not expected to touch the level of around 10% seen last year, sources put expected PS growth for

1988 in the region of 3 or 4%. Growth is predicted to be particularly good in the UK where inward investment in the automotive and electronic industries should lead to increased demand for material.

PVC got off to a lively start in 1988, with producers reporting healthy domestic and export demand and an increasing tightness in the market. With sustained interest from buyers over the Christmas holiday, producers have so far failed to improve on the low PVC stock situation, which is still running at around 3 week's worth of supply.

Price levels are steady at DM1.52-1.60/ kg for pipe grade and DM2.10-2.30 for paste grade, but increases have already been announced in the Italian and French markets at L50/ kg and 10 centimes/ kg respectively. West Germany and the UK are holding back until the beginning of February with price

hikes, but consumers can expect levels to rise by around 10 pfennig/kg on pipe grade in West Germany with increases of around 20-30/ton scheduled in the UK depending on grade.

Producers are not anticipating much resistance to these increases as levels have been steady for some time and some customers have been put on allocation. Export markets continue to be healthy particularly the Far East, and current numbers are quoted at around \$1000 fob Rotterdam.

With European PVC demand racing ahead by around 7% last year, pundits are expecting 1988 to be another good year with over demand expected to increase by at least 4%. But with demand soaring ahead and no new capacity due to stream, observers warn that further price increases will be on the cards.

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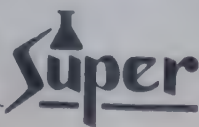
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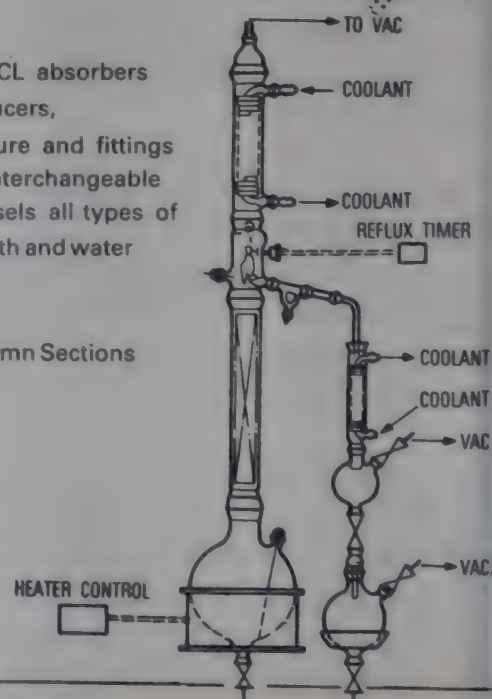
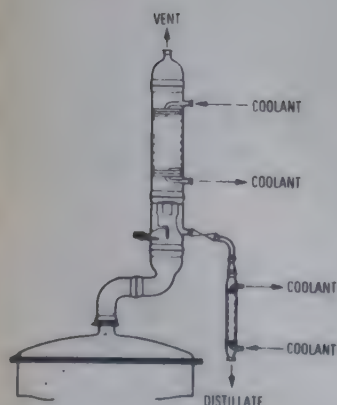
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In The European Market

naphtha prices have dropped to \$10-145/ton cif NWE in line with volatile crude and lack of prompt buying interest.

Ethylene prices have remained stable at \$420-440/ton cif although \$50/ton cif has been offered in the U.K. Observers described the market as "finely balanced and quiet" with little business done although the price trend is expected to be a slow move upwards. Spot material is easily available and naphtha product has no takers. BP is closing its Grangemouth cracker for two weeks which will tighten supply but with no other shutdowns planned buyers are hoping mild weather will keep crackers open.

The Propylene price slide after Christmas has bottomed out and price ideas have lifted to \$560-580/ton recently. Material has been offered at DM600/ton but buyers are more willing to accept DM580/ton.

Prices for butadiene are unchanged at \$550-570/ton fob NWE. Producers are disappointed

that the FF3200/ton contract price seems likely to be agreed but are resigned to a weak market until the beginning of Q2. US spot levels are still around 28 cents/pound and with weak dollar levels there have been more exports of SBR related products.

A flurry of activity lifted benzene prices above \$260/ton in early January when a German major Shell removed several thousand tons of spot material from the market to complete an 11,000 ton shipment to a US affiliate.

Toluene prices are steady at \$205-210/ton but sources say this mainly reflects speculative buying by traders wishing to take a position in toluene. Gasoline pool and chemical demand continues to be weak.

The paraxylene market has continued to tighten with a number of plant problems shortening supply. Indian buyers are looking for major volumes in Europe but prices between \$400-450/ton cif are well below seller's current hopes. Turkey is tendering a total of 16,000 tons in

the next 2 months in parcels of 4,000 ton each. First quarter contract between Deutsche Shell and Hoechst at DM610/ton has met with approval in the market.

Orthoxylene prices have also firmed slightly to \$285-290/ton in a tightening market.

Styrene has continued to amaze the market with crazy spot numbers being talked on both side of the Atlantic, buoyed by strong demand from derivative producers in the Far East. T1 prices are being discussed in the range \$1400-1450/ton but there have yet to be any deals struck at this level. T2 is now in the range \$1450-1480/ton.

Strong MTBE and formaldehyde demand has lifted European methanol prices. T1 product is moving at \$165-175/ton cif NWE and T2 at \$183-189/ton. Availability is extremely tight and all deep-sea imports to Europe are committed. Levels in the US are close to 80 cents/gallon and the market is desperate for product. Despite disadvantageous dollar levels for European exporters product has been shipped to the US at DM400/ton cif.

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News From the American Market

SKYROCKETING GAS PRICES FOLLOW THE FREEZE

It may prove short-lived, but spot prices for natural gas have jumped considerably in the past few months. From a low in the \$1.30/million Btu area in the fall, prices rose to \$1.50 in mid-November, then began a rapid climb to current levels near \$2.30/ million Btu. A cold spell gripping Northeastern and North Central states gets the blame, causing a surge of new demand. The freeze has been responsible for a similar climb in crude oil and heating oil prices and strong demand for all energy sources. Effects on industrial users have been confined to California so far, where Southern California Gas has cut shipments to industrial buyers in favour of supplying the residential market.

PRICE INCREASE FROM AIR PRODUCTS

Air Products and Chemicals increased methanol prices 6% on Jan.1 for tank-car and tank-truck quantities, to 58c/gal, from its Pace, Fla., plant and from its Whiting, Ind., location. The company also raised the price of the material to 62c/gal from Barberton, Ohio, and to 63c/gal from Charlotte, N.C. Customers pay freight charges in addition to the new prices. Air Products also issued new prices for acetic acid, starting Jan.1, ranging from 28c/lb for glacial (100%) grade to 31c/lb for 40% grade. Users of foodgrade acetic acid pay 2c/lb more. From February, Air Products will increase off-list prices for dimethylethanolamine catalyst by 4c/lb (a 3-4% rise). The company will also hike prices of vinyl acetate ethylene copolymer and vinyl acetate homopolymer spray-dry powders by 6c/lb (up 4.5%), used in building products, to offset

higher costs of vinyl acetate and other raw materials.

SHELL AND JSR JOIN FORCES

Shell Chemical and Japan Synthetic Rubber (Tokyo) are strengthening their ties in the synthetic rubber business. Shell Polymers and Catalysts Enterprises (SPACE), a Shell Oil (Houston) subsidiary that has specialized in joint ventures and acquisitions in the past three years, has formed a joint venture with JSR America (New York City), a subsidiary of Japan Synthetic Rubber to market solution styrene-butadiene rubber (SBR). The new company, called Deltadyne Solution Elastomers, will sell tailored grades of its products to U.S. tyre makers under the trademark Deltaflex. The products will be supplied by affiliates in Western Europe and Japan and inventoried in the U.S. The two partners say they will evaluate the possibility of establishing a domestic manufacturing base in the future. Japan Synthetic Rubber has other ties with Royal/Dutch Shell: It set up a joint-venture company called Nihon Solution Rubber with Shell Kosan in 1986, to produce and market speciality elastomers in Japan. Shell and JSR say they have a strong position in the worldwide solution SBR market, backed by a strong technology and patent position. SPACE notes that solution SBR has attractive rolling resistance, skid resistance and wear properties when used in tyre compositions.

A TEXAS BASE FOR DSM

DSM, the Netherlands' largest chemical company, has set up a sales office in Houston as part of a more coordinated, market-oriented approach to its business in North and South America. The Houston office, which will operate under the

name DSM Hydrocarbon Sales Americas, will act as the center for sales efforts in the U.S., Central and South American markets. Previously, DSM's Central and South American clients were serviced by a Mexican subsidiary. The new office will sell a variety of DSM's products including such commodity chemicals as benzene, butadiene, C9 resin, methyl tertiary butyl ether, caprolactam, melamine and acrylonitrile, well as a variety of fine chemicals.

MONSANTO ADDS SUPPORT FOR BIPHENYLS

Monsanto will expand production of biphenyls and derivatives by a total of 15 million lb, at two plants: one at Anniston, Ala., the other at Newport, England. The company makes biphenyls and p-nitrobiphenyl at Anniston. John J. Ferguson, Director of Functional Products in the Speciality Chemicals Division of Monsanto Chemicals, says the expansion will provide "adequate and reliable feedstock supplies for growing new applications and markets." Biphenyls and the high molecular-weight polyphenyls are used in a wide range of products, including heat transfer fluids, solvents for carbonless paper and chemical intermediates.

A SODIUM CHLORATE EXPANSION

Alby-Olin (Stamford, Conn.), a joint venture of Olin and the Aktie Klorat division of Sweden's Maxima, will expand its sodium chlorate capacity 50% by mid-1989.

The company, which operates production units at Valleyfield, Quebec and McIntosh, Ala., notes that sodium chlorate consumption in North America has been growing at a rate of 3% year recently, aided by a healthy pulp industry and increased use of chlorine dioxide in bleaching processes.

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Technological Scene Abroad

CONTINUOUS PROCESS FOR FLUORINATED AROMATICS

EniChem Sintesa, the fine chemicals subsidiary of Italy's EniChem (Milan), is now operating a 5,000-metric-tons/year unit at Tresno to produce fluorinated aromatics. According to EniChem, the process offers a substantial cost saving over batch processes because it uses a continuous diazotization step in the production cycle. Diazotization is the reaction of a primary aromatic amine with nitrous acid in the presence of excess mineral acid to produce a diazo compound. Sources at EniChem's two European competitors — Rhone Poulenc (Paris) and Hoechst subsidiary Riedel-de-Haen (Seelze, West Germany) — confirm that EniChem material is on the market, but they do not accept EniChem's claim that the process is cheaper.

Rhone Poulenc earlier this year revealed a 30% expansion — to about 5,000 m.t./year — of its fluorobenzene capacity at Salindres, France, using its proprietary process. Competitors fear the fluoroaromatics field is getting crowded. Mallinckrodt (St. Louis) is building a 1,000-m.t./year plant that will be the first in the U.S. It, too, will use a continuous process.

MORE COGENERATION PROJECTS FOR THE CHEMICAL INDUSTRY

Exxon Chemical will get into the cogeneration business with a new 100-MW unit to make steam and electricity for its Baytown, Tex., refining and chemical complex. The \$65 million unit is due onstream in early 1989, with construction set to begin in February. Exxon has its own nat-

ural gas supplies, and the cheaper power from the unit will replace purchases from local utility Houston Lighting & Power. That utility currently is mulling over a steep rate increase in early 1988, partly to cover the \$5 billion cost of a new nuclear power plant in Matagorda County, due for startup around that time.

The chemical industry operates more cogeneration capacity than any other business segment, according to a year-end report by Hagler, Bailly (Washington, D.C.), a management consulting firm. The industry has 13,600 MW of capacity operating, under construction or announced, mostly in Texas and California.

A SUCCESSFUL TEST FOR A SOLAR PROJECT

A system that converts solar energy into chemical energy, under development at Sandia National Laboratories (Albuquerque), has been successfully field-tested in Israel as part of a U.S.-Israel bilateral agreement, according to Sandia. The process uses solar energy and a catalyst to convert a mixture of methane and carbon dioxide into hydrogen and carbon monoxide.

The idea is that those gases could be transported long distances, then the chemical reaction could be reversed, liberating process heat. "The advantage is that you can transport thermal energy without suffering a lot of heat loss," says James Fish, a member of Sandia's technical staff. "In closed-loop laboratory tests we have got 60-70% efficiencies [thermal input to output], whereas if you used solar energy to make electricity and used that to heat

something, you would get only about 30%."

The field tests, carried out in a 20-kW solar furnace at the Weizmann Institute of Science in Rehovot, were of a solar receiver and chemical reactor only. They were not closed-loop tests; i.e., the reactions were not reversed. In the tests, a mixture that had slightly more carbon dioxide than methane (to avoid carbon deposition problems) was heated to 800°C over a rhodium-alumina catalyst. The conversion temperature is about 750°C, says Fish, but the system used vaporized sodium to transfer heat, rather than solar energy. Sandia had planned a 300-kW closed-loop test, in which heat ranging from 300°C to 700°C would be recovered in stages in a reverse reaction, using rhodium and nickel catalysts. However, the Department of Energy cut out funds for that project, says Fish.

FRENCH DEVELOPMENT IN NONLINEAR OPTICAL MATERIALS

Rhone-Poulenc (Paris) and the French national telecommunications research center, Centre National d'Etudes des Telecommunications (Issy les Moulineaux), have set up a joint research project on new materials for use in nonlinear optics.

The team aims to develop a new generation of components for optoelectronics and computers; it plans to synthesize, characterize and develop new organic and inorganic materials for use in generation, treatment, transmission and detection of acoustic electronic signals and optical signals.

Most of the work on the project will take place at Rhone-Poulenc's Saint-Fons center near Lyon and at the French research center's laboratory at Bagneux.

Environment

EEC PROPOSES PROJECTS BUT FACES R&D CRITICISM

The EEC commission has unveiled its plans for a new research programme which aims to increase the application of biotechnology to the agro-industrial sector. The five year Eclair programme, which will start this year and receive Ecu80m (\$101m), will seek to improve existing crops, develop alternative crops to meet industrial and energy needs and create environment friendly types of fertilizer.

Following discussion with expert groups in member states the commission has chosen three areas for development projects. Improving or developing crops for industrial use such as flax, cuphea and euphorbia; developing biodegradable plant protection products and fertilizers which leave no residues; and where the two sectors interface apply new computer technology and cultivate new varieties.

The council of ministers has already granted approval to a research programme, also worth Ecu80m, to help developing nations. Like an original pilot scheme, priority areas for the programme are health and agriculture but for this one the budget is doubled.

The programme will cover many research areas such as improving tropical species, environmental management and evaluation of water resources. In the health sector priority will be given to projects concerned with combating bacterial and viral diseases.

The first EEC "science at the service of development" programme, from 1983 to 1986, provided

Ecu40m to fund 411 projects, 228 of which were in agriculture and 183 in healthcare. Successes, the EEC claims, include genetically improved sorghum, new reafforestation techniques that preserve the fertility of tropical soils and new sleeping sickness discoveries.

Research council ministers, however, are not happy with the way the commission runs its four joint research centres. The ministers claim that Brussels is not going far enough with its proposals to increase efficiency at the centres. Brussels is proposing to cut the centre's total dependence on the EEC research budget to 60% but some member states argue that it should go further and faster.

LAWYERS CONSIDER TEST CASE

Lawyers representing the UK department of health and social security and US drugs major SmithKline French are debating the implication of a judgement that could have serious repercussions for manufacturers of generic drugs. SmithKline won its case denying the UK licensing authority access to its own toxicological data on cimetidine.

The US drugs manufacturer won a court order preventing the DHSS using its data for the licensing of generic substitutes of its blockbuster anti-ulcer drug *Tagamet*. The judge agreed that the right to use the data was unfair but ruled that both the firm and the DHSS should get together and establish a compromise.

The two groups of lawyers are expected to come to a decision within the next few weeks but the

DHSS still has the right to appeal 28 days after that. Since the UK Government introduced its "white list" encouraging generic substitution the UK national health service has saved about £75m/year (\$135m).

Meanwhile, the UK health minister, Tony Newton is studying the results of an inquiry into drug licensing in the UK. Drugs firms are concerned that it can take up to two years to gain marketing approval.

HSC UNVEILS CIMAH CHANGES

The UK Health and Safety Commission has unveiled details of proposed amendments to the Cimah regulations. The changes proposed will implement those made in the EEC directive adopted last year which amends the original "Seveso" directive.

Amendments in the document refer to schedules 2, 3 and 4 of the Cimah law setting out the processes to which, and dangerous substance with threshold quantities above which, the regulations apply. The changes will have to be implemented by member states by September of this year.

Included in the amendments are the Bhopal disaster-inspired threshold quantities for phosgene and methyl isocyanate in process activities and of chlorine in both storage and process activities. The amended law will also cover an additional 50 installations including liquefied petroleum gas plants.

Brussels is currently putting together additional amendments following the experience gained in the wake of the Sandoz spill in November 1986. Meanwhile, Sandoz has scaled down its estimate for damages to between SF 30m (\$22m) and SF 35m.

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NEWS FROM JAPAN

Monosilane Gas To Be In Oversupply Due to Successive Plant Building

Excessive trade competition in monosilane gas — staple raw material for semiconductor production — is being increasingly intensified. Komatsu Electronic Metals Co. doubled the production capacity of a 150-t/y plant last spring. Mitsui Toatsu Chemicals, Inc. has completed a monosilane / disilane plant, thereby more than doubling its monosilane production capacity.

Denki Kagaku Kogyo K. K. and L'Air Liquide SA (France) are scheduled to jointly inaugurate a large-scale plant whose production capacity reached several hundred tons a year, easily exceeding Japan's annual requirements. U.S. enterprises including Union Carbide — which has the world's largest monosilane plant — are stepping up their export drives for the Japanese market.

Japan's present monosilane-gas market is equivalent to at most 70-100 tons a year. Employing simple addition, the above-mentioned production expansion and stepping-up exports will result in combined supply reaching about 10 times the present market scale. The market will thus be glutted with the product, though demand is likely to increase in the latter half of the present fiscal year due to recovery of the semiconductor market.

Prices for the product markedly declined during the business slump in semiconductors lasting for the past two years. The industry will enter into price com-

petition after this year with a background of oversupply of the product.

Monosilane gas is used mainly for IC and LSI manufacture. Its potential applications are amorphous photosensitive drums for copiers solar cells and liquid-crystal TVs.

Mitsui-Cyanamid Pushing Sales Of 'CYMEL' Resin In Japan

Mitsui-Cyanamid Ltd. is striving to expand markets for its "CYMEL" methylated amino resin as it has recently boosted capacity for the resin by 50% to 4,500 t/y. CYMEL is attracting industrial attention across the world as an efficient cross-linking agent for thermosetting resins.

The company intends to expand CYMEL uses for "high-solid" paints for cars and structures in a bid to develop the brand product into a big-seller item like its high polymer flocculants which are its main items.

Mitsui-Cyanamid is an equally owned joint venture of Mitsui Toatsu Chemicals, Inc. of Japan and American Cyanamid Company of the U.S.

Asahi Chemical Plans Business In Computer-aided Plastic Moulding

Asahi Chemical Industry Co. has decided to commercialize a computer-aided engineering (CAE) system for plastic injection-molded products and molds. It is believed that computerization will help greatly to reduce the time and labor requir-

ed for designing such products and become prevalent in the plastic-processing industry in future.

Designing of plastic injection-molded products and molds has so far been conducted mainly by means of the feeling and experience of the designers.

The company will start conducting a service, sometime this year, offering knowledge and information obtained by its CAE system to customers of its plastic products and resins under its plan for commercialising the system itself in future.

Porous Glass Packing Material For Chromatographs On Sale

Ise Chemical Industries Co., together with Wako Pure Chemical Industries, has begun cultivating a market for its new packing material for high-speed liquid chromatographs and the column packed with it for analytical fractionation.

The packing material is a multiporous glass developed by Ise. Its pores are more uniform than those of silica gel and its pore size can be appropriately controlled. The column using the new packing material requires only one-third the time required in the case of using silica gel for fractionation.

The company intends to continue studies on application of the new packing material to a large-scale liquid chromatograph.

Sandoz Pharmaceuticals Enhancing Drug Testing, Sales Activities

Sandoz Pharmaceuticals Ltd., a Japanese subsidiary of Sandoz AG, is determined to strengthen its drug business operations in Japan in a bid to expand its an-

l sales to the Y100-billion or on its share of the Japanese market now accounting for 1.6% or 2% or more.

To this end, it will double within a few years the number of staff members engaged in preclinical testing and boost the number of detail men from about 500 to 600 by 1990 and further to 1000 within the first half of the 1990s. It has already increased the number of personnel engaged in clinical testing.

Sandoz drug business in Japan has been developing fast in recent years with the diversification of dosage forms of its drugs in addition to sales drives. Its main product items include anti-allergic agents, cardiovascular agents and immunotherapeutic agents.

It also plans to expand the production facilities at its Saitama factory.

Zeria Pharmaceutical To Build Second Plant in Tsukuba

Zeria Pharmaceutical Co. will start this February 1st-phase construction of its second manufacturing plant within an industrial complex located in Tsukuba, Ibaraki Prefecture. The construction work will be completed during this year.

The new plant will begin in 1989 producing ampuled liquid medicines. It will be operated by Zeria Kako Co. established last October by Zeria Pharmaceutical.

The products will be marketed through a nationwide distribution system — which Zeria Pharmaceutical will establish early this year in cooperation with drug wholesalers. The company plans

to promote new over-the counter (OTC) drug operations by means of the distribution system. In connection with this, it is scheduled to start marketing minisized ampules of liquid medicines in partnership with Shiseido Co.

The company's existing plant was built at its Saitama factory in 1975. Its capacity has become inadequate despite four previous plant expansions.

Since 1986 the company has been implementing its 2nd-phase middle-term business plan aimed at attaining annual sales of Y50,000 million by year 1990. The plan is being smoothly implemented and annual sales in the business term ending this January will reach Y42,500 million.

Asahipen Intent On Promoting Paint Business Abroad

Asahipen Corp. is moving toward scaling up overseas business operations including those for paint and painting equipment. The company has established Asahipen world Trading with the aim of importing from the company's overseas subsidiaries paint, painting equipment and semitinished products. The new subsidiary, together with the parent company's overseas business division, will work out production/marketing policies for overseas markets.

In addition, Asahipen Corp. has set up a joint venture in Taiwan in partnership with a local interest. The Taiwan subsidiary will produce painting equipment and export it to the Japanese and U.S. markets. The Japanese company envisages starting producing in other Asian countries, house-hold-use paint and those suitable for local markets.

It is also considering importing semi-finished products from its U.S. subsidiary — Asahipen America, Inc.

It aims at completing three production bases in Japan, South-east Asia and the States, thereby developing itself into an international enterprise.

Wako to produce fine Chemicals in US in 1989

Wako Pure Chemical Industries Ltd. recently announced that a plot of land of 57 acres (approx. 230,000 m²) in Chesterfield, Virginia which its wholly owned American subsidiary has purchased will be used as a site for production of drug intermediates and some other chemicals.

The plant to be constructed there in 1989 will be Wako's second production base overseas, following that of Wako Chemicals GmbH, its West German subsidiary. Although the details of the plan are still to be decided, the company intends to invest about \$10 million for Wako Chemicals, USA, Inc. to construct multipurpose production facilities for fine chemicals such as industrial-use chemicals, antioxidants and organic intermediates.

Wako's overseas operations began in 1971 with the setting up of the German subsidiary in Düsseldorf. In 1983 Wako built a plant for clinical reagents and related chemicals to expand its share of the European market.

The U.S. subsidiary was started in 1981 for marketing common reagents, clinical reagents, organic intermediates and some specific chemicals. Its yearly sales in the U.S. have come to reach Y1 billion.

The yen's sharp appreciation is the major factor behind the plant's construction in the U.S., according to the company.

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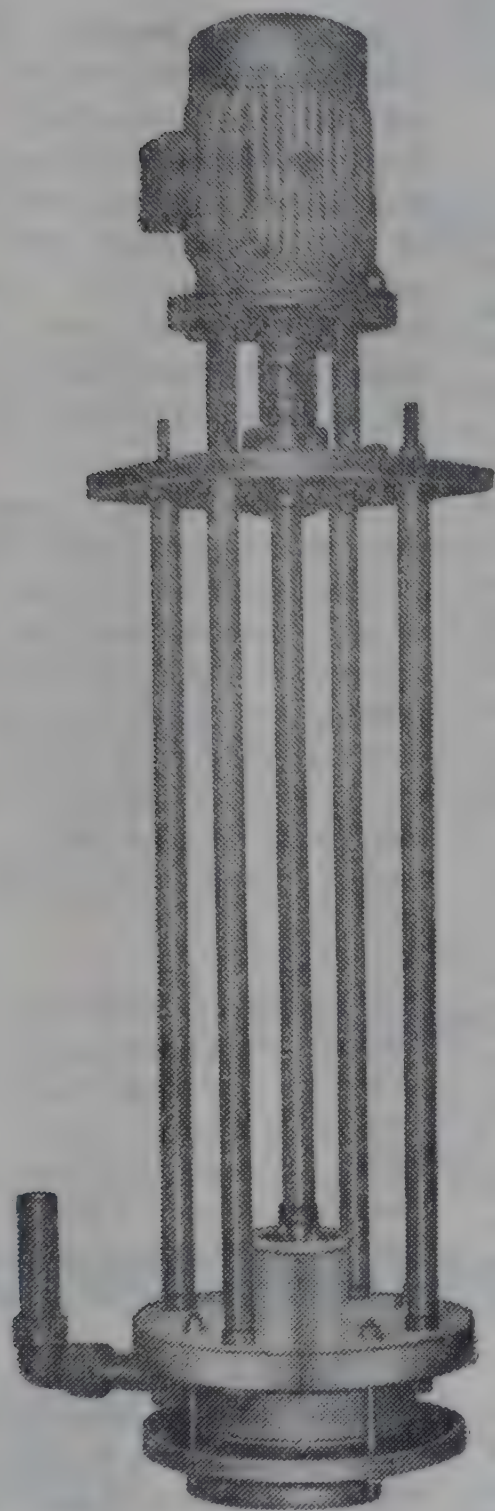
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New Developments from Japan

Large-sized, Tough Sendust Alloy Target Developed

Nippon Mining Co. has successfully developed large-sized (diameter: 16 inches), tough Sendust-alloy targets and started delivering samples for use in the manufacture of thin-film magnetic heads.

Sendust alloy is suitable for magnetic heads due to its excellent magnetic properties and hardness. It is regarded as promising material for thin-film magnetic heads, which facilitate high-density recording for computer hard disks and VTRs. It, however, has the fragility peculiar to intermetallic compounds and it has hitherto been difficult to transform the product into a large-diameter target.

When the new target is employed, 500-1,000 heads can be simultaneously treated with thin films formed thereupon. The company is test-manufacturing the products at the rate of 10 pieces a month and will start mass-producing them by the middle of this year.

In order to diminish the fragility of Sendust alloy, it controlled the solidification structure of the Sendust ingot, thereby reducing the residual stress inside the ingot. In addition, it toughened the ingot by subjecting it to hot plastic-working and thermal treatment processes. The thereby obtained target is not broken when sputtering is conducted under extremely severe conditions including load of 20w/cm².

Magnetic heads are classified into sputtering-film type and laminate type. Mass production of the former calls for supply of

large-diameter Sendust-alloy targets. To date the diameter concerned has been 5 inches at most.

New Anticancer Agent Developed By Yamanouchi, Meiji College

Yamanouchi Pharmaceutical Co. and Meiji College of Pharmacy have jointly developed a new type of anti-malignant-tumor agent dubbed "TOPOSTIN (TPS)" and will start preclinical tests on it sometime this year.

TPS is a neutral aliphatic compound with a molecular weight of about 600 and is derived from flexibacteria. It has proved highly effective against leukemia afflicted human cells and fibrous tumor cells on a cellular level.

While most conventional anti-malignant-tumor agents act as DNA topoisomerase-type II (topo-II) inhibitors, TPS serves as a DNA topoisomerase-type I (topo-I) inhibitor like camptotecin developed by both Yakult and Daiichi Seikaku. Its anticancer activity is different from the former type and has also proved effective against camptotecin-tolerant cells.

TPS has been found to work in such a way as to inhibit topo-I activity to promote the reunion of DNA chains, whereas camptotecin acts to inhibit topo-II activity to promote the breakage of DNA chains.

Yamanouchi has begun mass production of TPS to prepare for preclinical tests and will continue R&D on a full scale.

Assistant-free Boron Nitride Sintered Under Normal Pressure

Denki Kagaku Kogyo K. K., together with Government Industri-

ai Research Institute, Kyushu has succeeded in sintering high purity assistant-free boron nitride (BN) under normal pressure.

In this new process, raw material boron nitride can be molded into any form using a pressing, cold-isostatic-pressing or slip-casting method and sintered at high temperature and under normal pressure. It is capable of producing items with various shapes and, in principle, of eliminating a cutting process for them.

It can, therefore, markedly reduce production costs for BN products and will help rapidly expand their demand area. The company aims at aggressively exploiting markets in such fields as electrical-insulation parts, jig for sintering various material machinery parts produced from molten metal and refractories etc.

The physical properties of BN products manufactured by means of the new process are: density, 1.45 ± 0.5g/cm³; purity, over 99.9%; Shore hardness, 20 ± 5; bending strength, 550kg/cm² at normal temperature, 510 kg/cm² at 800°C and 210 kg/cm² at 1,200°C.

In the conventional process, sintering assistants (binders) are mixed with boron nitride, followed by sintering under high pressure using a hot press. The resultant BN products, however, are not pure enough and mostly acquire a rod shape. They require a cutting process in the final stage. The most advantageous feature of the new process is that boron nitride can be put in any mold under normal pressure and target products are, therefore, shaped prior to the sintering process.

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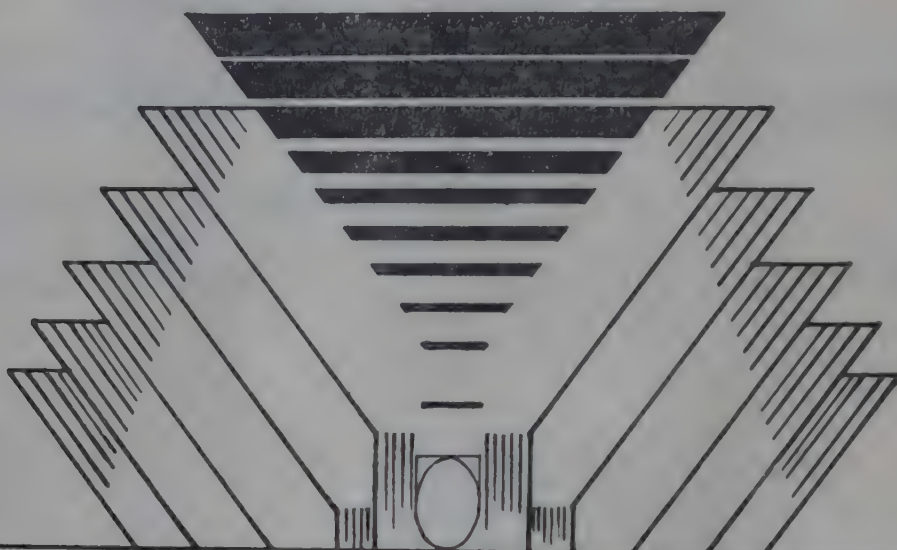
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MARKET INFORMATION

Phenol, Acetone Down

The prices of phenol and acetone shown a downward trend in the Bombay Chemicals Market mainly due to the increased availability from D.C. Hydrogen peroxide continued to be tight due to irregular supply from

the local manufacturer. Naphthalene crude and fine moved up by Rs. 2/-. Citric acid, due to seasonal demand, was in limelight.

In the dyes section, dyes intermediates from Atul Products were in short

We cannot guarantee the accuracy of the prices published in CHEMICAL WEEKLY as they are based only on the enquiries made by our correspondent — and, as such they are not FIRM PRICES as between a buyer and a seller. The prices are published only with a view to giving some ideas of market conditions.

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supply. The other items and dyestuffs were in good demand.

(Prices as on 4th February, 1988)

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Ammonium carbonate (Di)	17.00	Caustic soda (Flakes)	8.50	Copper sulphate	17.00
Ammonium bicarbonate	4.75	Caustic soda (Solid)	7.75	Chromic acid	50.00
Ammonium chloride	3.50	Caustic soda (Lye)	6.00	Chronic chloride	120.00
Ammonium nitrate	4.00	Calcium chloride 70% (solid)	3.25	Cobalt oxide	280.00
Arsenic white powder	21.00	Calcium chloride 75-80% (fused)	3.50	Carbitol	52.00
Crylamide	59.00	Calcium chloride 36% (Anhydrous)	5.00	Dicalcium phosphate (Anhydrous)	16.00
Barium carbonate	6.00	Calcium Carbonate PPT	3.00	Ferric chloride (Lumps)	6.00
Leaching powder (33% Cl)	3.75	Calcium carbonate (Activated)	3.55	Ethylene urea	56.00
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Industrial Wax	25.00	Soda Ash (Tata)	3.90	Cyclohexanol	43.00
Litharge	15.00	Soda Ash (Birla)	3.75	Diacetone	34.00
Lead Acetate (Tech.)	28.00	Soda Ash (Imp.)	3.50	Diethylene glycol (DEG)	31.00
Lithopone	15.00	Sodium bicarbonate	5.25	Diethyl Phthalate	52.00
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Menthol crystal (Flakes) 185+Ex.+ST		Sodium silicate	3.00	Dimethyl Phthalate	28.00
Menthol bold	205+Ex.+ST	Sodium acetate	5.90	Diethyl Adipate	52.00
Menthol crystal bold	245+Ex.+ST	Sodium alginate	220+ST	D'butyl Adipate	42.00
Magnesium carbonate (Japan)	16.00	Titanium Dioxide (Anatase)	53+ST	Dipentene	15.00
Magnesium carbonate (Indian)	15.00	Titanium Dioxide		Dimethylamine 40%	12.00
Maleic Anhydride (per kg)	35+ST	(Rutile — RCR ₂)	69+ST	Dimethylamine 60%	14.00
Mercury (75 lbs.)	9,000.00	Tartaric acid (Crystal)	94.00	Ethyl Acetate	23.65
Nickel chloride	60.00	Trisodium phosphate	4.80	Ethyl Acrylate	46.00
Oxalic acid	19.00	Thiourea	69+ST	Ethylene Dichloride	11.00
Peppermint oil (Rectified) 90+Ex.+ST		Urea (Tech)	2.75	Ethylene Glycol	23.25
Potassium carbonate (Indian)	19.00	Vacuum salt	1.00	Formic Acid (Imp.)	31+ST
Potassium carbonate (Imported)	21.00	Zinc Dust	30.00	Formaldehyde	5.80
Potassium bichromate	22.00	Zinc Oxide	30.00	Glycerine (CP)	49.00
Potassium phosphate (Mono)	14.00	Zinc chloride powder		Glycerine (IW)	45.00
Potassium phosphate (Di)	14.00	(technical)	14.00	Hydrogen peroxide 50%	
Polyvinyl alcohol (No. 117)	88.00	Zinc sulphate	3.90	(Resale)	30.00
Polyvinyl alcohol (No. 173)		SOLVENTS	Per kg.	Isopropyl Alcohol	17.50
(Resale)	96.00	Acetic Acid (Glacial)	13.50	Isobutyl Alcohol	28.00
Polyvinyl alcohol (No. 208)	95.00	Acetic Anhydride (Resale)	24.00	Monoethanolamine	46.50
Paraformaldehyde	18.00	Acetone (Resale)	17.00	Melamine	43+ST
Phthalic anhydride 96%	23.25	Adipic Acid	50.00	Morpholine (Indian)	65.00
Pentaerythritol (Resale)	53.00	Aceto Acetanilide	50.00	Methyl Ethyl Ketone	36.00
Paraffin wax	13.50	Aniline Oil	44.00	Methyl Isobutyl Ketone	36.00
Rangolite (German)	70.00	Benzoate Plasticiser	33.00	Methyl Acrylate	42.00
Rangolite (Czech.)	46.00	Butyl Acetate	39.00	Methylene Dichloride	24.00
Sodium sulphate (Fine)	4.00	Butyl stearate	36.00	Meta Cresol	45.00
Sodium sulphate (Coarse)	3.80	Butyl acrylate	80+ST	Nitrobenzene	17.00
Sodium sulphide 50-52%		Butanol (Resale)	35.00	Nitric Acid (Con.) (RCP)	2.50
(Flakes)	8.00	Benzyl chloride	24.00	Ortho Cresol	32.00
Sodium sulphide 58-60%		Benzo trichloride	16.00	Phenol	31.00
(Flakes)	9.00	Benzoyl chloride	22.00	Propylene Glycol	30.00
Sodium sulphide pure (Flakes)	12.25	Benzyl alcohol (FPC)	36.00	Polyethylene Glycol (No. 200)	40.00
Sodium nitrite	13.25	Bromine Liquid	42.50	Polyethylene Glycol (No. 400)	37.00
				Polyethylene Glycol (No. 500)	42.00

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Polyethylene Glycol (No. 4000)	38.00	Anthranilic Acid	61.00	N-Methyl J. Acid	400.00
Polyethylene Glycol (No. 6000)	50.00	2-Amino-4-Nitrophenol (Imp.)	140.00	N-Methyl Aniline	135.00
Para Cresol	40.00	Blue B. Base (Local)	235.00	Naphthalene Crude	21.00
Styrene Monomer	32.00	Beta Naphthol (Atul)	55.00	Naphthalene (Refined)	23.00
Sorbitol	18.50	Benzidine Dihydrochloride (BDH)	72.00	Ortho Anisidine (OA Imp.)	84.00
Trichloroethylene	26.00	Bromamine Acid	375.00	Ortho Dichloro Benzene (ODCB)	10.50
Triethanolamine	50.00	BON Acid	108.00	OT Base	93.00
Sulphuric Acid	2.10	Chicago Acid	280.00	Para Dichloro Benzene (PDCB)	16.00
Turpentine Oil (Germany)	8.00	Coach Acid	53.00	Para Anisidine (PA-Imp.)	110.00
Turkey Red Oil (50%)	11.75	C. Acid (Imp.)	260.00	Para Anisidine (PA-Local)	87.00
Triethylamine	50.00	Cyanuric Chloride (Japan)	118.00	PNA	66.00
Vinyl Acetate Monomer	40.50	2, 4, DNCB	26.00	Para Cresidine (Imp.)	325.00
SOLVENTS		Dihydrothio PTOS (Imp.)	500.00	Para Amino Azo Benzene (India)	125.00
	Per Litre	Dimethyl Aniline	58.00	PNCB	27.50
Benzene	8.80	Diethyl Aniline	150.00	Para Amino Acetanilide	140.00
N-Heptane	8.00	Di-amino stilbene disulphonic acid	120.00	1-Phenyl 3-methyl-5 Pyrazolone	115.00
N-Hexane	8.75	3, 3-DCB (Imp.)	165.00	Phenyl J. Acid	340.00
Methanol	6.75	Gamma Acid (Atul)	165.00	Para Amino Benzoic Acid	170.00
Solvent Naphtha Heavy	9.50	H. Acid (Atul)	150.00	PT Base	88.00
Solvent Naphtha Light	8.50	G. Salt	56.00	Rhoduline Acid	505.00
Toluene	9.25	Isophthalic Acid	39.00	Resist Salt	18.00
Xylene	14.00	J. Acid	275.00	Resorcinol	140.00
DYES INTERMEDIATES PRICES ARE WITHOUT TAX & EXCISE		J. Acid Urea	270.00	Sodium Naphthionate	62.00
	Per kg.	K. Acid	95.00	5-Sulpho-Anthranilic Acid	60.00
Alphanaphthylamine	60.00	MDPS (German)	210.00	Sulphanilic Acid	26.00
Alpha Naphthol (Imp.)	160.00	MNA	75.00	Sulpho Tobias Acid	100.00
Aceto Acetic Ester (Methyl)	68.00	Meta Urido Aniline	135.00	Trichloro Benzene (TCB)	15.00
Ammonium Molybdate	170.00	MPD (Local)	130.00	Tobias Acid	110.00
		MPD (Japan)	150.00		

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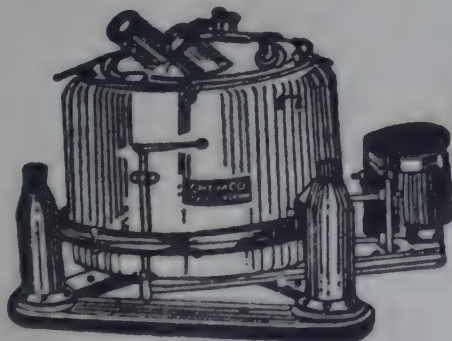
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3, Krishnappa Maistry Street, Woods Road, Madras-600 002. Phone : 849727

Bombay Dyes Market

(Prices as on 4th February, 1988)

ACID COLOUR	Per Kg				
Acid Violet 4BS	143.00	Brill. Violet Extra	126.40	Scarlet RR	214.85
Acid Maroon V	110.00	Blue 2B	86.60	Rubine 3B	223.05
Acid Orange II	77.80	Blue G	170.50	Rubine CB	364.90
Acid Orange ILY	63.05	Sky Blue FB	188.25	Blue GL	318.95
Acid Red A	107.25	Copper Blue GR	147.00	Blue BGF	636.55
Crosein Scarlet MOG	155.00	Fast Greenish Blue GL	114.60	Navy Blue RF	270.40
Acid Scarlet 3R	99.90	Developed Black BT	116.10	Brown 3REL	200.40
Acid Red 38N	135.00	Blue NB-2B	300.20	Black GEL	324.20
Acid Red R2R	132.00	Blue NB-2BC	185.30	Dark Brown 3B	317.40
Acid Red RS	88.00	Developed Black NB-GHB	185.30		
Acid Green V	230.00	Green B	111.65	BASE COLOURS	Per Kg
Acid Patent Blue AS	250.00	Green NB-B	188.25	Fast Yellow GC	80.20
Acid Coomasi Blue	200.00	Green 2B-N	188.25	Fast Orange GC	135.45
Acid Yellow 5GN	85.00	Brown MR	154.40	Fast Scarlet R	166.90
Acid Red PG	85.00	Brown CN	107.25	Fast Scarlet RC	126.65
Acid Red GRS	78.00	Golden Brown G	140.35	Fast Scarlet RCR	99.05
Acid Black 10 BX	121.95	Catechin G	120.50	Fast Scarlet G	121.65
Acid Black BX	98.40	Omega Tan	126.40	Fast Scarlet GN	91.50
Acid Black Wax	135.50	Catechin GS	102.80	Fast Scarlet GG	72.70
Procinil Yellow GS		Black E Hly Conc.	142.60	Fast Scarlet GGS	72.75
(ICI, UK)	265.00	Black E Extra Hly Conc	142.60	Fast Red B	203.20
Procinil Red GS (ICI, UK)	530.00	Black NB-ER Hly. Conc.	310.50	Fast Red RC	119.15
Procinil Blue RS (ICI, UK)	315.00			Fast Red R Flakes	149.25
Procinil Scarlet G		DISPERSOL COLOURS	Per Kg	Fast Red TR	166.80
(ICI, UK)	600.00	Yellow 6G Powder	143.80	Fast Red TR Oil	183.15
Procinil Orange G		Red B 3B Powder	247.80	Fast Red RL	237.10
(ICI, UK)	250.00	Red B 2B Powder	323.20	Fast Red KB Oil	201.90
Procinil Rubine (ICI, UK)	550.00	Red CB Powder	439.15	Fast Bordeaux GP	201.95
		Red D2B Powder	477.40	Fast Garnet GBC	94.05
DIRECT COLOURS	Per Kg.	Violet C 4R	521.90	Fast Violet B	505.60
Yellow 3GX	88.10	Blue BG Powder	235.45	Fast Blue BB	521.45
Gun Yellow RCH	124.00	Blue BN Powder	103.75		
Fast Yellow GCH	141.15	Blue D 2R Powder	476.25	NAPHTHOL COLOURS	Per Kg
Yellow CFG Hly. Conc.	312.00	Navy BT Powder	243.90	ASG	217.00
Fast Yellow GS	111.65	Blue B 2G Powder	210.20	AS	143.00
Fast Yellow CHRS	95.45	Black BT Powder	182.60	ASSW	279.75
Viscose Orange A	166.15	Blue BR Powder	390.20	ABBS	189.15
Fast Orange GR	133.75	Yellow 7GL	338.60	ASBO	195.65
Red	96.90	Yellow 5RX	218.80	ASD	175.50
Dark Tan	78.25	Yellow 3G	367.25	ASOL	179.35
Red IIR	72.55	Yellow	140.00	ASTR	279.75
Red 4B	169.10	Yellow AL	135.30	ASPH	279.75
Bordeaux BW	132.30	Yellow Brown REL	247.50	ASE	196.05
Fast Scarlet 4BS	166.55	Yellow FFL	463.60	ASEI	184.40
Red 12B	170.55	Gold Yellow GG	259.70	ASLB	1632.60
Bordeaux Hly Conc.	194.00	Pink REL	247.00	ASBT	1817.00
Cotton Red N	117.05	Red REL	468.65	ASWG	143.00
Brill. Fast Helio B	278.00	Red 2B	327.40	ASSG	397.70
Brill. Fast Helio 2B	297.00	Red FB	324.20	ASSR	480.50
Brill. Fast Helio 2B	297.00	Red Violet FBL	469.85		
Brill. Fast Helio 2RS	136.20	Orange 3R	196.65		
Brill. Fast Helio BS	116.10	Violet 3R	280.00		
		Violet RL	275.45		
		Violet 6R	485.75		

Delhi Market

DELHI: FEB. 5 (NNS) — Titanium dioxide slipped by Rs. 2.50/5 per kg. The local chemicals market during the week under review, due to increased offerings from Kerala, says NNS. Citric and tartaric acid also dropped by Rs. 25/50, while menthol prices recorded a handsome gain of Rs-20/26 on the wake of restricted arrivals from Kerala. Volume of the business was moderate.

On reports that 3 to 4 trucks of the commodity were transported from Kerala along with lack of demand by paint makers and plastic units, titanium dioxide RC.822 suffered a steep fall of Rs.5 at Rs.67 per kg. Titanium dioxide Anatase reacted downward by Rs.2.50 at Rs.52.50. Ammonia bicarb came cheaper by Rs. 3 at Rs. 125 owing to improvement in supply and poor demand by bakeries.

Citric and tartaric acid declined by Rs. 25/50 at Rs. 2250/2475 and Rs. 200 per 50 kg. owing to dehoarding tendency by stockists caused by acute shortage of money. Hydrogen peroxide advanced by Rs. 2 in the absence of demand at higher level.

Menthol medium and bold went up sharply by Rs. 20/25 at Rs. 235 and

Rs. 245 per kg. respectively owing to restricted inflow from U.P. Poor production of menthol in U.P. this year due to acute shortage of power also aided the upward trend. Menthol flake flared up from Rs. 202 to Rs. 228 on reports that about 2 tonnes of the commodity were purchased by speculators. Menthol flake February and March delivery were transacted at Rs. 238 and Rs. 248. Mentha oil advanced by Rs. 10 at Rs. 175.

In the absence of fresh supply along with adequate stock position, Sodium nitrate and nitrite advanced by Rs. 430 and Rs. 725 per 50kg. Caustic soda increased by Rs. 5 on increased demand. Soda bicarb looked up by Rs. 5/8 on better offtake and poor offerings. Formic acid recovered by Rs. 2/3 on tight stock position. Tri sodium phosphate advanced by Rs. 5/10 on keen demand by detergent powder makers. Mercury ruled static at Rs. 9200 per flask. Naphthalene balls moved up by Rs. 50 at Rs. 1250 per 50 kg. followed by good seasonal consumption.

Dyes and colours remained quiet at their previous levels.

(DELHI MARKET RATES AS ON FEBRUARY 5, 1988)

Ammonia Bicarb (per 25 kg)	125.00	Boric acid Technical (per 50 kg)	1000.00
Mercury (per flask)	9,200.00	Paraffin wax (per 50 kg.)	600.00
Soda ash (per bag)	255-285.00	Tartaric acid (per 50 kg)	7,200.00
Ammonium Chloride (per 50 kg.)	110-180.00	Borax Granular (per 50 kg)	580.00
Caustic soda solid (per 50 kg)	385.00	Borax Crystal (per 50 kg)	600.00
Caustic soda flakes (per 50 kg)	380-385.00	Sodium Nitrite (per 50 kg)	725.00
Citric acid (per 50 kg)	2,200-2,475.00	Sodium Nitrate (per 50 kg)	430.00
Stable Bleaching Powder Shriram (per 25 kg)	96.00	Camphor Powder (per kg)	87.00
Stable Bleaching Powder KCI (per 25 kg)	89.00	Camphor Thal (per kg)	95.00
Stable Bleaching Powder MODI (per 25 kg)	92.00	Menthol Medium (per kg)	235.00
Sod. Bicarbonate	258-260.00	Menthol Flake (per kg)	228.00
Sod. Hydro Sulphite (per kg)	32-36.00	Menthol Bold (per kg)	245.00
Rangolite (per kg)	45-83.00	Glycerine (per kg)	45-55.00
		Sodium Silicate (per quintal)	250.00
		Hexamine (per kg)	28.00
		Acetic Acid Glacial (per kg)	14.50-18.00

Copper Sulphate (per quintal)	1800-2100.00
Formic acid (per kg)	30-31.00
Formaldehyde (per kg)	6.50
Hydrogen Peroxide (per kg)	31-33.00
Calcium Carbonate (per tonne)	2500-4000.00
Acid Slurry Soft (per kg)	25.00
Acid Slurry Hard (per kg)	32.00
Phosphoric Acid (per 50 kg)	825.00
Pot. Nitrate (per quintal)	900-1200.00
Pot. Permanganate (per 50 kg)	2300.00
Sod. Bichromate (per 50 kg)	1025-1125.00
Tri-Sod. Phosphate (per 50 kg)	330-340.00
Titanium Dioxide Anatase (per kg)	52.50
Titanium RC-822 (per kg)	72.00
Zinc Oxide (per mt)	34000-38000.00
Phenol Carbolic Acid (per kg)	42.00
Carbon Tetrachloride (per kg)	16.50
Chloroform (per kg)	26.00
Sodium Sulphate (per 50 kg)	160-165.00
Naphthalene Balls (per 50 kg)	1250.00

DYES & COLOUR per kg.

Naphthol AS	150.00
Naphthol ASG	235.00
Naphthol ASBS	200.00
Naphthol ASTR	302.00
Naphthol ASOL	191.00
Naphthol ASBO	208.00

DIRECT DYES (perkg)

Black E. Conc.	92-155.00
Diazo Black B.T.	125.00
Green B.	119.00
Blue 2-B	86.00
Sky Blue FB	200.15
Basic Auramine 'O' Conc.	55-100.00
Basic Rhodamine B.500%	220-300.00
Basic Methylene Blue	92-130.00
Basic Violet	142-160.00
Basic Malachite Green	160-185.00
Acid Orange	45-52.00

Dye Materials Exported

BOMBAY

(From 17.11.1987 to 27.11.1987)

AZOIC BLUE 8 : To Jakarta : Little & Co., 2,550 kgs., Rs. 63,206.

AZOIC COUPLING COMPONENT : To Odessa : Amar Dye Chem. 25,200 kgs., Rs. 17,01,000.

AZOIC RED 2 : To Jakarta : Little & Co., 2,550 kgs., Rs. 56,374.

AZOIC ORANGE 3 : To Jakarta : Little & Co., Bombay, 2,550 kgs., Rs. 22,221.

BENZASOL BLACK BC : To Rotterdam : Chemiequip Ltd., 3,000 kgs., Rs. 2,67,631.

BENZIDINE DIHYDROCHLORIDE : To Rotterdam : The Atul Products, 5,007 kgs., Rs. 1,85,887.

BLEACHING POWDER (STABLE) : To New York : Shriram Foods & Fertilisers, 38.8 M.T., Rs. 1,02,244.

BRILLIANT ORANGE H2R : To Odessa : Usha Intercontinental, 6,000 kgs., Rs. 9,90,000.

COALTAR DYES : To Bangkok : Indian Dyestuff Industries, 61 kgs., Rs. 16,754; 10 kgs., Rs. 14,809; To Antwerp : Indian Dyestuff Industries, 500 kgs., Rs. 96,554; To New York : Jaysynth Dychem P. Ltd., 10,300 kgs., Rs. 12,43,101; To Antwerp : Indian Dyestuff Industries, 500 kgs., Rs. 1,29,406.

DIRECT BLACK 38 : To Rotterdam : Dharamsi Morarji Chemicals, 10 kgs., Rs. 6,27,533.

DIRECT DARK GREEN B H/C : To Bangkok : Karsandas Mavji, 1,000 kgs., Rs. 50,503.

DIRECT DYES : To Keelung : Chemitex Enterprises, 50 kgs., Rs. 1,87,400; To Jakarta : Sanjay Corpn., 2,500 kgs., Rs. 1,27,406.

DIRECT TURQUOISE BLUE H/C : To Bangkok : Jay Che-

mical Industries, 2,500 kgs., Rs. 77,000.

DYES INTERMEDIATE : To Busan : Metro Exports P. Ltd., 500 kgs., Rs. 74,415; To Keelung : Vivid Exports, 7,606 kgs., Rs. 4,11,104; To New York : Vivid Exports, 4,015 kgs., Rs. 1,55,624; 3,948 kgs., Rs. 1,55,624; To Keelung : Vivid Exports, 108 kgs., Rs. 3,66,413; To New York : Vivid Exports, 1,925 kgs., Rs. 54,940; To Bangkok : Gokul Enterprises, 5,376 kgs., Rs. 2,58,875.

FAST BLUE CBR : To Bangkok : Colour Chem Ltd., 2,000 kgs., Rs. 2,31,695.

G.SALT : To New York : Vivid Exports, 1,875 kgs., Rs. 5,038.

GOLD YELLOW GH : To Jakarta : Little & Co., Bombay, 2,550 kgs., Rs. 45,782.

H.ACID : To Hamburg : Sathana Nitrochem Ltd., 13,219 kgs., Rs. 10,79,740; To New York : Metrochem Industries, 6,410 kgs., Rs. 5,77,162; 12,820 kgs., Rs. 11,54,324; To Odessa : Sajjan Impex P. Ltd., 1,26,000 kgs., Rs. 10,83,830.

METANIL YELLOW RX : To Penang : Indian Dyestuff Industries, 1,000 kgs., Rs. 4,00,079.

METHYL VIOLET 2B CONC. : To London : Ravi Chem Dye, 2,000 kgs., Rs. 1,37,687.

N-METHYL J. ACID : To New York : Vivid Exports, 1,144 kgs., Rs. 2,08,817.

NAVINON DARK BLUE : To Rotterdam : Indian Dyestuff Industries, 1,000 kgs., Rs. 1,85,511.

OPTICAL WHITENING AGENT : To Bangkok : Indian Dyestuff Industries, 5,000 kgs., Rs. 1,55,972.

ORANGE C2R : To Hong Kong : Jay Chemical Industries, 500 kgs., Rs. 85,000.

ORGANIC PIGMENT : To Leytorn : Sudarshan Chemical Industries, 5,000 kgs., Rs. 3,69,633; To Manchester : Sudarshan Chemical Industries, 11,500 kgs., Rs. 6,00,129.

PIGMENT DYESTUFFS : To Singapore : Colour-Chem Ltd., 1,000 kgs., Rs. 86,925.

PHENYL GAMMA ACID : To Amsterdam : Rasayan Ltd., 5,900 kgs., Rs. 7,53,673.

PHTHALOCYANINE GREEN 2724 : To Bangkok : Sudarshan Chemical Industries, 1,500 kgs., Rs. 1,95,795.

PHTHALOCYANINE GREEN GNX : To Keelung : Colour Chem Ltd., 500 kgs., Rs. 59,067.

R. SALT : To New York : Vivid Exports, 1,697 kgs., Rs. 55,742.

REACTIVE ORANGE 12 : To Odessa : Usha Intercontinental, 2,500 kgs., Rs. 2,35,000.

REACTIVE TURQUOISE BLUE G : To Bangkok : Karsandas Mavji, 40,212 kgs., Rs. 3,20,41,605.

RHODAMINE B EXTRA : To Bangkok : Jindal Dye Intermediates, 1,000 kgs., Rs. 1,50,500.

SODIUM BISULPHATE : To Chittagong : Hico Products Ltd., 200 kgs., Rs. 8,300.

SODIUM METANITROBENZENE : To New York : Jeevan Products, 18,000 kgs., Rs. 26,671.

SYNTHETIC COAL TAR DYES : To Rotterdam : Chemiequip Ltd., 550 kgs., Rs. 78,741; To Bangkok : Sanjay Sales Corporation, 2 M.T., Rs. 80,653; To Jakarta : Chemiequip Ltd., 1,000 kgs., Rs. 1,47,963; To Antwerp : Jindal Dye Intermediates Pvt. Ltd., 2,000 kgs., Rs. 95,500; To Rotterdam : Ravi Chem. Dye, 2,500 kgs., Rs. 3,10,000; To Antwerp : Chemiequip Ltd., 2,000 kgs., Rs. 1,61,630; To Rotterdam : Indian Dyestuff Inds., 1,000 kgs.,

Rs. 1,50,430; 500 kgs., Rs. 80,682; Jai Chem Dye, 1,450 kgs., Rs. 50,000; To Hamburg: Jaysynth Dychem, 1,000 kgs., Rs. 30,300; To Antwerp: Blue Rock Dyes Chemicals, 5,000 kgs., Rs. 61,137; To Hamburg: Jaysynth Dychem, 350 kgs., Rs. 11,000; To Chittagong: Atic Industries Ltd., 500 kgs., Rs. 1,98,400; To Rotterdam: Indian Dyestuff Industries, 1,000 kgs., Rs. 1,66,343.

SYNTHETIC ORGANIC DYES: To Singapore: Colour Chem Ltd., 275 kgs., Rs. 16,688; To Chittagong: Amritlal Chemaux Ltd., 80 kgs., Rs. 28,178.

SYNTHETIC ORGANIC DYE-STUFFS: To Antwerp: Dintex Dychem P. Ltd., 3,000 kgs., Rs. 2,05,979.

TEXTILE DYES: To Chittagong: Little & Co., Bombay, 1,000 kgs., Rs. 93,500; Dhake Dyes & Chem P. Ltd., 110 kgs., Rs. 49,934; Vipul Dyes & Chemical P. Ltd., 599 kgs., Rs. 36,938; Atic Industries, 700 kgs., Rs. 4,35,440; Amritlal Chemaux Ltd., 1,670 kgs., Rs. 4,25,041; Atic Industries, 250 kgs., Rs. 99,200.

VAT JADE GREEN FFB: To Chittagong: Dhake Dyes & Chemical P. Ltd., 90,670 kgs., Rs. 32,05,000.

VINYL SULPHONE: To Yokohama: Liberty Exports P. Ltd., 21,390 kgs., Rs. 20,40,657.

DYE MATERIALS IMPORTED MADRAS (From 6.1.1988 to 19.1.1988)

ANILINE COLOUR: From U.K.: Madura Coats Ltd., 10 kgs., Rs. 9,610.

DYES: From FRG: Khizaria Leathers, 2,500 kgs., Rs. 2,70,662; From U.K.: Shafeeq Shameel & Co., 300 kgs., Rs. 40,536; From FRG: Usman Sharif & Co., 250 kgs., Rs. 47,138.

INDARFLUENE BRILLIANT PINK: From FRG: Madura Coats Ltd., 15 kgs., Rs. 23,016.

SOLVENT BLACK 45: From FRG: Saba Tanning Chemicals, 250 kgs., Rs. 46,800.

MATERIALS IMPORTED BOMBAY

(From 7.12.1987 to 9.12.1987)

ACETIC ANHYDRIDE: From Bulgaria: Chemiequip Ltd., 15,200 kgs., Rs. 1,68,032.

ADIPIC ACID: From Australia: Kamla Dias and Devicen Ltd., 10,433 kgs Rs. 1,65,740.

ALDRIN TECHNICAL: From Belgium: Sajdeb Processors P. Ltd., 5,250 MT. Rs. 39,299.

ALKYL BENZENE: From Australia: Poona Dal & Besan Mills, 7 MT. Rs. 66,143; From China: Bhandary Metallurgical Corpn. Ltd., 7 MT., Rs. 66,143; From FRG: Nav. Bharat Engg., Inds. P. Ltd., 7 MT., Rs. 66,143; From Japan: Arun Sales Corporation., 14 MT. 1,32,286. From UAE: Laxmi Board & Paper Mills Pvt. Ltd., 7 MT. 66,143.

ANISOLE: From Japan: Shree Gopal Ind., Corporation, 8,400 kgs., Rs. 3,42,421.

ANTHRAQUINONE 2,6-DI-SULPHONIC ACID DISODIUM SALT: From Japan: Bright Brothers Ltd., 3,031 kgs., Rs. 90,295.

AROMATIC CHEMICALS: From Spain: Partap Rajasthan Copper Foil & Spn., 100 kgs., Rs. 16,397.

ASTRAZON RED VIOLET 3RN: From USA: Kanwarjit Balbir, 590 kgs., Rs. 1,71,842.

BENZOIN: From FRG: Polycat Powders P. Ltd., 100 kgs., Rs. 14,179.

BETA NAPHTHOL: From FRG: Indian Telephone Inds., 1,300 kgs., Rs. 43,030.

BLANKOPHOR ER LIQUID H/C: From Korea: Janta Plastic Corpn. 60 kgs., Rs. 21,032.

T-BUTYL PEROXIDE: From FRG: Dr. Beck & Co., 100 kgs., Rs. 17,641.

C-ACID: From Japan: United Allied Steel, 12,800 kgs., Rs. 6,44,174.

CARBON BLACK: From Taiwan: Chemicals Corpn. of India, 2,520 kgs., Rs. 97,268; From U.K.: Mazgaon Docks Ltd., 1,200 kgs., Rs. 1,88,581; From USA: Ballarpur Inds. Ltd., 2,728 kgs., Rs. 54,404.

CARNAUBA WAX: From Iraq: Jaysinh Kumar & Co., 13,500 kgs., Rs. 3,32,436.

COPPER (I) CHLORIDE: From Yugoslavia: Rising Star Plastics Pvt. Ltd., 450 kgs., Rs. 22,983.

COUMAPHOS 50% WP: From FRG: Rathi Dye Chem Ltd., 10,000 kgs., Rs. 72,875; From Romania: SRS Bearing Industries, 207 kgs., Rs. 81,687.

COUMARIN: From France: Rallis India Ltd., 250 kgs., Rs. 48,654.

CRESYLIC ACID: From UK: Vickers SY International Ltd., 48,000 kgs., Rs. 7,46,688.

CYANURIC CHLORIDE: From Japan: Karamchand Industries, 5,000 kgs., Rs. 2,16,625; From Taiwan: Kanpur Industries, 10,000 kgs., Rs. 4,33,248.

D-ALPHA PHENYL GLYCINE . HYDROCHLORIDE: From U.K.: M.S. Trading Co., 10,920 kgs., Rs. 35,40,139.

D-CAMPOR SULPHONIC ACID: From Newzealand: Fairdeal Enterprises, 491 kgs., Rs. 72,184.

DIETHYL THIO PHOSPHONYL CHLORIDE: From Japan: Judep Steels, 16, 194 kgs., Rs. 5,14,540.

DIOCTYL TIN OXIDE: From Japan: Lunekki Industrial

Corporation, 500 kgs., Rs. 74,139.

1,4-DIOXANE: From Taiwan: Cipla Ltd., 2000 kgs., Rs. 42,365.

DIPHENYLOXIDE TECH: From USSR: Lok Vangmaya Grila P. Ltd., 5171 kgs., Rs. 1,09,536.

DIVINYL BENZENE: From Japan: Rajan Tube Products P. Ltd., 7584 kgs., Rs. 4,06,658.

ETHOXY METHYLENE MALONIC ACID ESTER: From Korea: Metal Box India Ltd., 4,000 kgs., Rs. 6,19,592.

ETHYL CELLULOSE: From FRG: Nebula Chemicals P. Ltd., 136 kgs., Rs. 32,342.

ETHYLENE GLYCOL: From France: Siemens Ltd., 2990 kgs., Rs. 34,123.

ETHYL MERCAPTAN: From Netherlands: Volhro Ltd., 12,480 kgs., Rs. 2,49,489.

FERRIC OXIDE: From FRG: Super Lable Mfg. Co., 20,000 kgs., Rs. 5,61,648.

FORMIC ACID 85%: From FRG: Guest Keen William Ltd., 40,000 kgs., Rs. 2,96,065. From FRG: Hubli Opticians, 11,235 kgs., Rs. 83,146; From FRG: Marbis Metal Products P. Ltd., 10 Mts., Rs. 72,119; From Iraq: Bukhari Traders, 10 Mts., Rs. 72,119; From Iraq: Shaheda Traders: 10 Mts., Rs. 72,119; From Japan: Nagarjuna Coated Tubes Ltd., 41,895 kgs., Rs. 3,10,051; From Japan: Sipta Coated Steels Ltd., 10 Mts., Rs. 72,119; From Jordan: Raashi Fertilizers Ltd., 10 Mts., Rs. 72,119; From Saudi Arabia: Saiyadri Paper Mills Ltd., 10 Mts., Rs. 72,119; From U.S.A. Kanoria Steels, 10 Mts., Rs. 72,119.

GLYOXAL 40%: From France: Spie Capag/NKK/Toyo Consortium: 2 Mts., Rs. 21,536; From FRG: G. Loncabos & Co., 3.99 Mts., Rs. 43,051; From

U.K., Atic Industries Ltd.: 3.99 Mts., Rs. 42,841; From U.S.A.: Bharat Heavy Electricals Ltd., 3.99 Mts., Rs. 42,841; From U.S.A. ONGC: 8 Mts., Rs. 87,378; From USA., SRSK Chemicals, 27.936 Mts., Rs. 3,00,423.

GUANIDINE NITRATE: From Japan: Super Lable Manufacturing Co., 69,795 kgs., Rs. 11,993.

GUM ARABIC: From Canada: Raj Enterprises, 9380 kgs., Rs. 6,209; From U.K.: Vir Hosiery Factory: 9,380 kgs., Rs. 62,091.

GUM BENZOIN: From Norway: K. Sanal & Company, 200 kgs., Rs. 6,884.

GUM ROSIN: From China: Bharat Petroleum Corpn., 17.55 MT., Rs. 1,17,335; From FRG: Nebula Chemicals Pvt. Ltd., 18 Mts., Rs. 1,22,727; From Hong Kong: Nathani Paper Mills Ltd., 18 MT., Rs. 1,09,620; From Pakistan: Uttamchand Deuanchand: 19 MT., Rs. 1,07,214.

GUM ROSIN IS GRADE: From FRG: Visnagar Taluka Audyogic Sahakani: 126 MT., Rs. 8,73,623.

GUM ROSIN WW GRADE: From China: Coates of India Ltd., 35.1 MT., Rs. 2,34,670; From China: Dujodwala Resins & Terpenes: 100 MT., Rs. 6,15,005; From China: Goodlass Nerolac Paints, 34 MT., Rs. 2,19,598; From FRG: National Textile Corpn., 17,325 kgs., Rs. 1,10,097; From Indonesia: Blue Bell Polymers P. Ltd., 18 MT., Rs. 1,22,727; From Indonesia: JBA Printing Inks, 18 MT., Rs. 1,21,535.

GUM TURPENTINE: From Denmark: Sanakhai Chemicals Ltd., 51 MT., Rs. 5,46,910.

HDPE EXTRUSION GRADE: From Japan: Khetan Synthetic P. Ltd., 16.5 MT., Rs. 2,00,970.

HYDROGEN PEROXIDE 50%: From Australia: Indtron Electronic P. Ltd., 4 Mts., Rs. 37,088; From FRG: Chemical Process Equipment P. Ltd., 4 Mts., Rs. 37,088; From Japan: Mitsui & Co. Ltd., 4 Mts., Rs. 37,088.

HYDROGEN PEROXIDE: From FRG: Salvi Chemical Industries, 4 Mts., Rs. 37,088.

HYDROSULPHITE CONC.: From Taiwan: Samar Polytex P. Ltd., 10,000 kgs., Rs. 1,09,223.

HYDROXYLAMINE SULPHATE: From Belgium: Llyods Steel Ind. Ltd., 6,000 kgs., Rs. 1,61,643.

IODINE CRUDE: From Australia: Indtron Electronics P. Ltd., 2,000 kgs., Rs. 4,76,610; From Japan: Lub Cut Incorporation, 2,000 kgs., Rs. 4,75,690; From Korea: Kaycer Radio Co., 2,000 kgs., Rs. 4,75,690; From U.K.: Mazagon India Ltd., 2,000 kgs., Rs. 46,99,902.

ISOBUTYL BENZENE: From Japan: P. Naresh & Co., 14 Mts., Rs. 5,10,780.

ISOOCTYL THIOGLYCOLATE: From Japan: Suryo Udyog P. Ltd., 10,080 kgs., Rs. 4,36,715.

ISOPHTHALIC ACID: From Japan: Indian Organic Chemicals Ltd., 1,000 kgs., Rs. 13,239; From Japan: K. Uttamlal (Exports) P. Ltd., 1,000 kgs., Rs. 13,239.

LILIAL: From Switzerland: Ranga Rao & Sons. 570 kgs., Rs. 1,44,729.

LIQUID HELIUM: From USA: Industrial Oxygen Co. P. Ltd., 68.35 litres, Rs. 17,97,096.

LITHIUM CARBONATE: From China: Rachana Textiles, 1,497 kgs., Rs. 79,760; From USA: D.J. Fluorine, 1,000 kgs., Rs. 47,039.

MAGNESIUM: From Japan: J.B. Industries, 5 MTS., Rs. 2,01,776.

MALEIC ANHYDRIDE: From Afghanistan: Shailender Sani & Son (HUK), 1,000 kgs., Rs. 1,27,758; From U.S.A.: Kanoria Steels, 17,500 kgs., Rs. 2,42,806.

3-METHOXY PROPYLAMINE: From FRG: Bharat Heavy Electricals Ltd., 3,060 kgs., Rs. 1,53,198.

METHOXY DICHLORO ACETATE: From Japan: Mehta Pharmaceuticals Ltd., 100 kgs., Rs. 33,676; From Japan: Nichiman Corpn., 1,000 kgs., Rs. 33,343.

METHOXY ETHYL KETONE: From Netherlands: Goodyear India Ltd., 660 kgs., Rs. 13,843; From U.K.: The Bhor Industries Ltd., 12.48 MT., Rs. 1,57,294.

METHYL PARATHION TECH. 80%: From GDR: Vijayalakshmi Insecticides: 10,400 kgs., Rs. 2,77,667.

MICROCRYSTALLINE WAX: From FRG: Camlin Pvt. Ltd., 6,000 kgs., Rs. 42,100; From FRG: Glindia Ltd., 6,000 kgs., Rs. 42,100; From FRG: Skanan Hardware Pvt. Ltd., 21 MTS., Rs. 1,73,764; From Hungary: Veekay Agents P. Ltd., 13,000 kgs., Rs. 91,218; From Taiwan: Chemicals Corpn. of India, 18,000 kgs., Rs. 1,26,300.

MOLYBDENUM CONCENTRATED ORE: From U.K.: S. Lal & Co. Ltd., 11,037 kgs., Rs. 10,03,003.

MOLYBDENUM TRIOXIDE: From U.K.: Anupam Colour & Chemical Industries, 6.5 kgs., Rs. 46,337.

MOLYBDIC OXIDE: From Netherlands: Mehra Ferro Alloys, 10,000 kgs., Rs. 5,57,595.

MONOSODIUM GLUTAMATE: From France: Larsen & Toubro, 15,422 kgs., Rs. 2,58,263.

MONTAN WAX: From FRG: Shree Synthetic Ltd., 11,000 kgs., Rs. 95,310.

NAPHTHALENE CRUDE: From FRG: Sandoz (I) Ltd., 16.552 MT., Rs. 99,164.

NICKEL CATALYST: From Netherlands: The Vegetable Vitamin Food Co., 7,500 kgs., Rs. 5,50,212; From Sweden: Associated Bearing Co. Ltd., 3,000 kgs., Rs. 2,30,565.

4-NITRO-2-AMINO PHENOL: From Japan: BASF India Ltd., 400 kgs., Rs. 51,632.

5-NITRO-2-AMINOPHENOL: From Japan: BASF India Ltd., 300 kgs., Rs. 1,31,068.

ORTHO CHLORO BENZALDEHYDE: From FRG: Diamonds Dyes & Chemicals, 880 kgs., Rs. 63,081.

PARAFFIN WAX: From U.S.A.: Cummins Diesel and Service Ltd., 490 MTS., Rs. 45,26,716.

PARAFORMALDEHYDE: From Brazil: Jain Plastics, 18 MTS., Rs. 97,705; From Spain: Garware Paints Ltd., 16,000 kgs., Rs. 94,475.

PCB CHEMICALS: From U.K.: S.A.E. Ltd., 872 kgs., Rs. 76,143.

ORTHO PHENITIDINE: From U.K.: Munnu Export House, 2,000 kgs., Rs. 97,969.

PHENOL USP: From U.S.A.: Parekh Marketing P. Ltd., 16,800 kgs., Rs. 2,61,403; From U.S.A.: Rallis India Ltd., 16,800 kgs., Rs. 2,61,403.

PHTHALIC ANHYDRIDE: From Afghanistan: Shailender Sani & Son (HUF) 110 MTS., Rs. 9,07,280.

POLYVINYL ALCOHOL: From China: Grover Silk Mills, 3 MTS., Rs. 52,957.

POTASSIUM CHLORIDE: From Brazil: As-U-Like Gems, 60 MTS., Rs. 1,34,245.

PRECIPITATED SILICA: From FRG: Nebula Chemical Pvt. Ltd., 500 kgs., Rs. 38,402; From Japan: Prakash Pipes & Industries Ltd., 6.5 MT., Rs. 52,939; From U.K.: India Book House, 500 kgs., Rs. 38,402.

PROPIONIC ANHYDRIDE: From New Zealand: Fairdeal Enterprises, 1,140 kgs., Rs. 37,864.

RANGOLITE: From FRG: Bindal Silk Mills P. Ltd., 960 kgs., Rs. 1,42,925.

ROCK PHOSPHATE: From France: Larsen & Toubro, 1000 MTS., Rs. 6,90,366; From Pakistan: Jugaldas Damodar Mody Co., 2,000 MTS., Rs. 13,74,935; From Pakistan: Vasanth Traders, 2,000 MTS., Rs. 13,51,849; From Saudi Arabia: Sahani Industries (I) Ltd., 700 MTS., Rs. 4,81,226.

SILICON CARBIDE: From Norway: Grindwell Norton Ltd., 200 kgs., Rs. 18,812.

SILICON METAL: From U.K.: Sareen Sports Industries, 21 MTS., Rs. 3,39,422.

SODIUM BROMATE: From Japan: The Atul Products, 2,520 kgs., Rs. 83,407; From Japan: Atic Industries Ltd., 5040 kgs., Rs. 1,66,814.

SODIUM CUMENE SULPHONATE: From FRG: Alka Printed Products P. Ltd., 1040 kgs., Rs. 15,402.

SODIUM POLYHYDROXY ALUMINIUM MONOCARBONATE: From USA: Win Medicare Ltd., 204 kgs., Rs. 13,815.

STYRENE: From Hungary: Veekay Agents P. Ltd., 15.2 MT., Rs. 2,78,108; From Japan: Digiconix International Ltd., 6084 MT., Rs. 1,17,722; From Thailand: Sagar Industries, 6.84 MT., Rs. 1,17,722; From Turkey: Mahalch and Motilal Kothari, 840 MT., Rs. 1,17,722.

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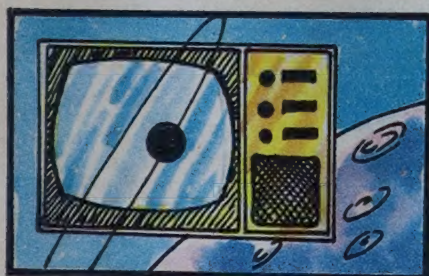
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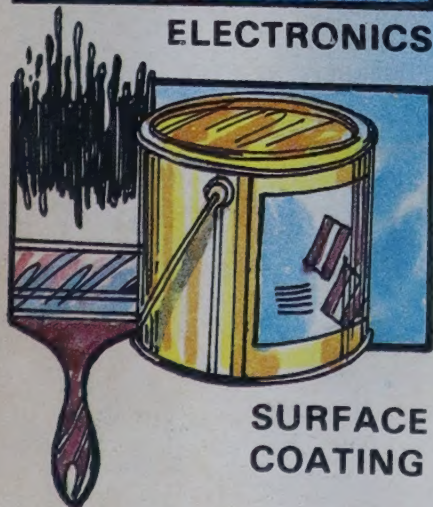
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